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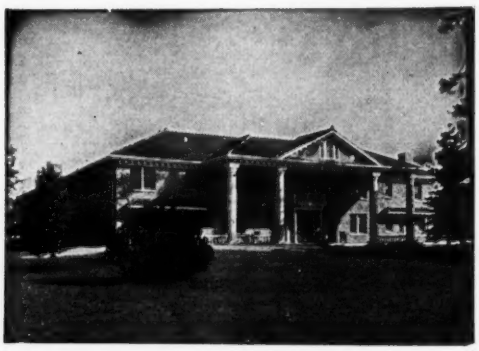

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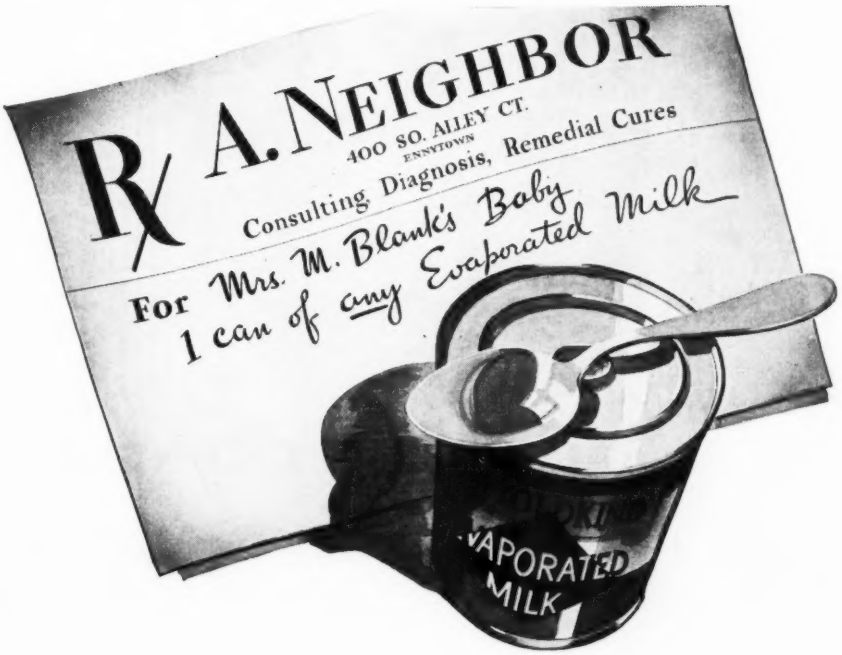

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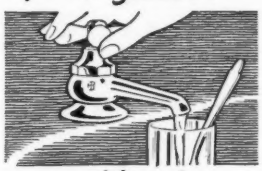
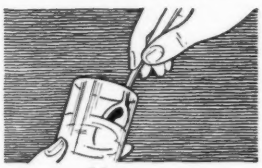


2– add water . .



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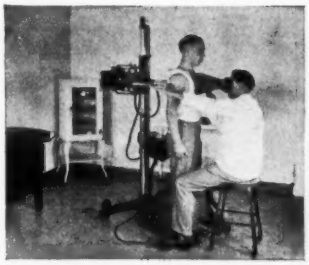
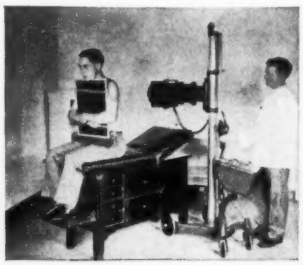
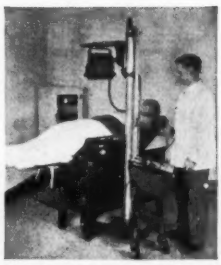

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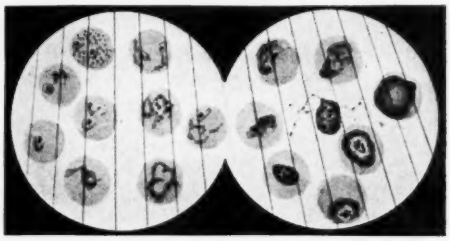

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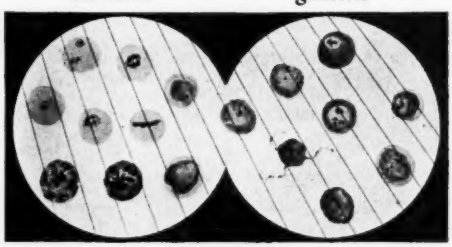

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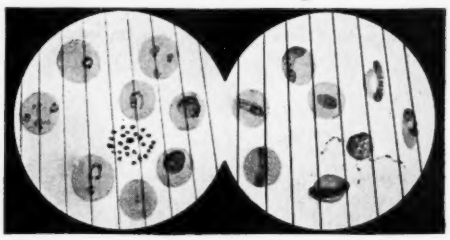

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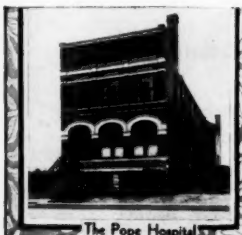

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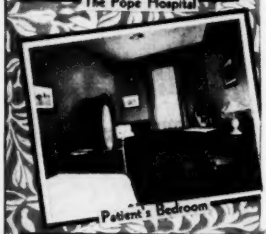

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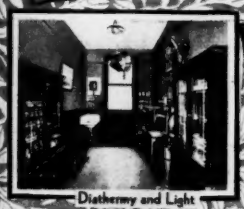

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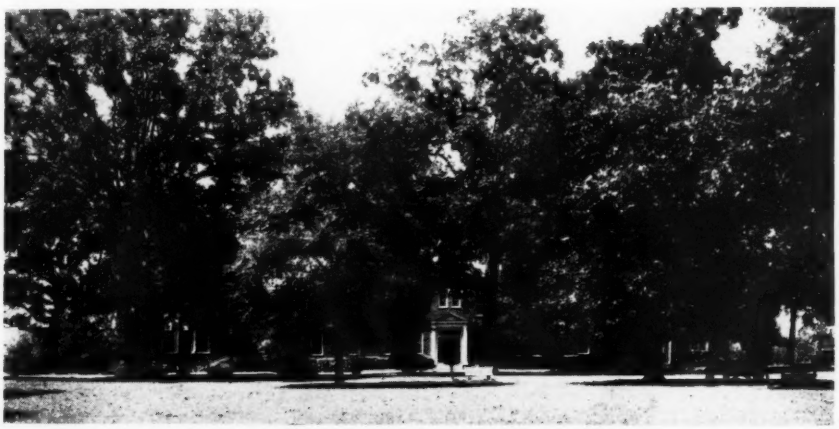

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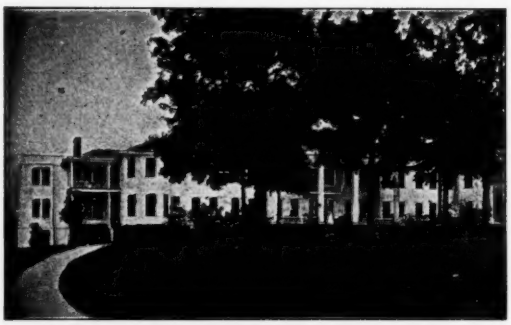

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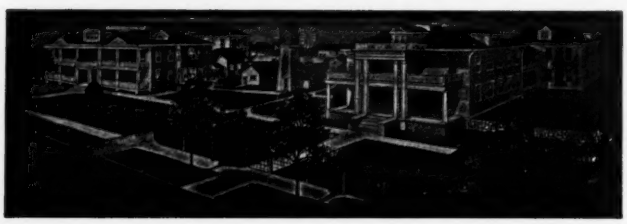

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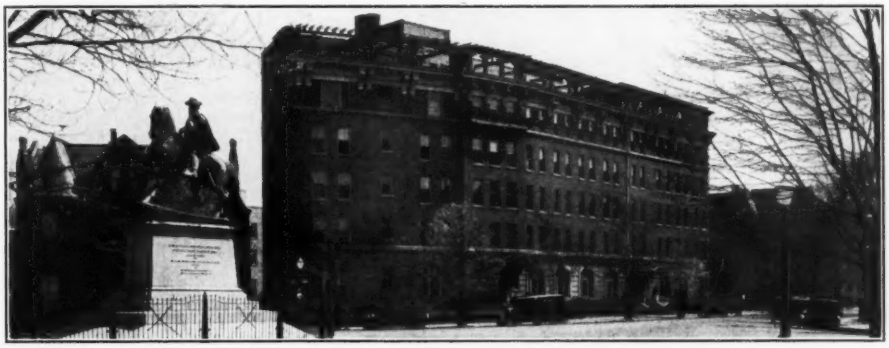

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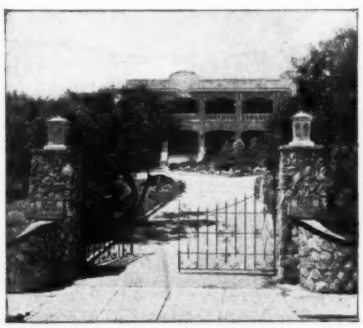

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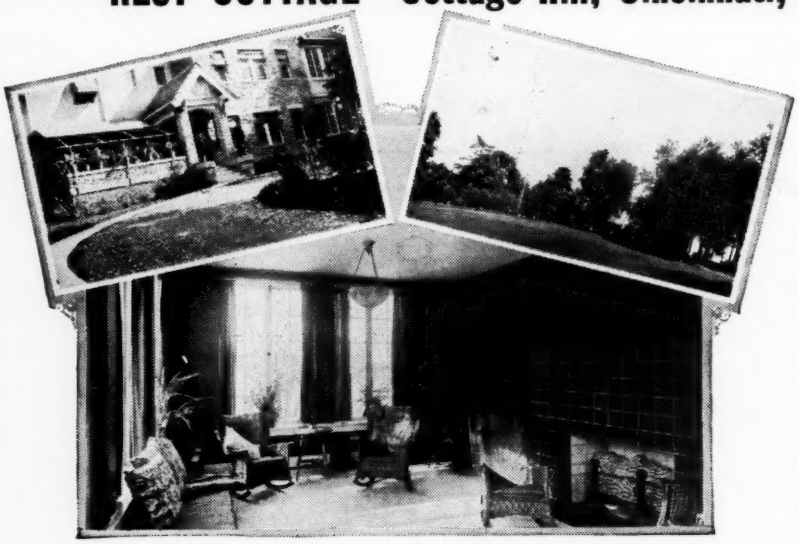

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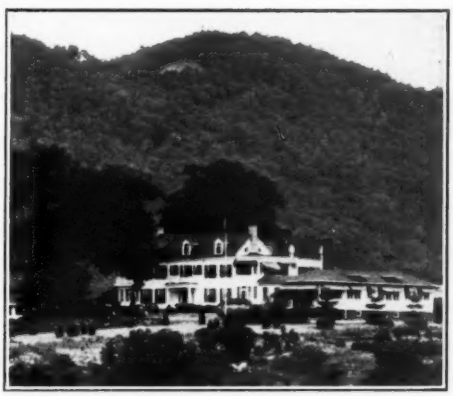

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JOURNAL OF THE SOUTHERN MEDICAL ASSOCIATION

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Volume XXVI APRIL 1933 Number 4

PIONEERS IN PUBLIC HEALTH IN THE SOUTHERN UNITED STATES*

By W. S. LEATHERS, M.D.,
Nashville, Tenn.

Public health organization in this country is largely a development of the past half century. There were only two state boards of health preceding the year 1872; namely, that in Massachusetts, which was established in 1869, and that in California, which was created in 1870. The first state board of health of the southern section of the United States was established by the General Assembly of Virginia in 1872. Little attention, however, was given to the development of efficient state and local health organizations prior to 1908. The public was uninformed concerning matters of public health, and funds were appropriated only to suppress disease in epidemic form. Epidemics of yellow fever, smallpox and cholera caused great disaster and fright and as a consequence during the Nineteenth Century practically all of the attention of health authorities in the Southern states was directed toward the control of these diseases.

Modern public health education had its beginning with the birth of the germ theory of disease about 1875, which was followed by the discovery of the causative organisms of many of the infectious diseases, improvement in laboratory technic and advancement in the knowledge of the modes of transmission of infection. Such discoveries and scientific progress were luminous to the pathway of the public health administrator and as a result much has been accomplished in building state and local health organizations upon a secure foundation during the past half century.

Remarkable progress has been made since 1911 in the establishment of full-time local county or district health departments in the United States. It is of much interest that of this number 451 are in Southern states. This is a significant development and one which if maintained and extended will have a far-reaching effect upon the prevention and control of disease.

To recount the important achievements of those who have rendered outstanding service in the advancement of public health in the southern United States should strengthen and stimulate health authorities who are endeavoring to maintain and provide more adequate administrative and technical services for the control of disease and promotion of public health. I wish, therefore, to review briefly contributions which have been made by some of the pioneers in this field of medical service.

DR. JOSIAH CLARK NOTT

Passing mention should, I think, be made of Dr. Josiah Clark Nott (1804-1873), of South Carolina, who in 1848 published in the *New Orleans Medical and Surgical Journal* a paper on yellow fever, in which he enunciated that the disease was of "animalcular origin" in contrast to the more widely accepted view that it was the result of decomposing animal and vegetable matter. He made many contributions of value to public health literature. I quote a description of him as recorded in the *Transactions of the American Medical Association,* Philadelphia, 1878:

"Dr. Nott was tall and thin, over six feet and not weighing more than 140 pounds. His stature was erect, his head large and forehead high; his face was strongly marked and noble in expression. In an assemblage of academic scholars he would have been noted and singled out as a man of remarkable character. Among his professional brethren in Mobile, he acquired in the latter years of his life the soubriquet of 'The old Roman.' His health was never robust, but his habits were so plain and simple that he was enabled to do a vast amount of work without being exhausted. During yellow fever epidemics he was riding day and night

*Read before the initial session of the Southern Branch of the American Public Health Association, meeting conjointly with the Southern Medical Association, Twenty-Sixth Annual Meeting, Birmingham, Alabama, November 15-18, 1932.

*From the Department of Preventive Medicine and Public Health, Vanderbilt University School of Medicine.

for two months at a time, and yet preserved his health and spirits."

The late Sir Andrew Balfour commented that he may have been an "old Roman," but he looked to him strikingly like a typical "Uncle Sam."

DR. JAMES LAWRENCE CABELL

It is of special interest to recall that the sixth President of the American Public Health Association, elected in 1878, was a member of the medical faculty and an alumnus of the University of Virginia, Dr. James Lawrence Cabell (1813-1889). He was a man of zeal and learning and because of his marked executive ability and unselfish devotion to duty he greatly advanced the work of public health education through the American Public Health Association. When Congress, in 1879, under the impending danger of a yellow fever epidemic, created a National Board of Health, Dr. Cabell was made President, filling the position with ability and honor for four years, during which time a commission was appointed to investigate the etiology and mode of transmission of yellow fever. Dr. Cabell retired from active work in 1889, having served for more than fifty years with renown as a physician, scholar and teacher.

DR. JEROME COCHRAN

The system of public health organization in Alabama is in some respects distinctive as compared with other states. The State Medical Association by legislative enactment is made the Board of Health and this in turn elects a Board of Councilors which functions as a public health committee or board. This system is the creation of Dr. Jerome Cochran (1831-1896), who was appointed in 1875 as Chairman of the Committee on Public Health. In this capacity he did a large and splendid service. Dr. Cochran drafted in 1875 the Act "to establish State and local boards of health in Alabama," and he was also responsible for the passage in 1877 of an Act "to regulate the practice of medicine in Alabama." Dr. Cochran claimed many friends and his eccentricities all the more endeared him to those who knew him. Because of his never-ceasing energy and consistent vigilance in his care for the public health, he was highly respected by the people of his State and the health authorities of the nation.

DR. RICHARD HENRY LEWIS

One of the pioneer statesmen and leaders, state and national, in the field of public health was Dr. Richard Henry Lewis (1850-1926), a man of great resources of mind and heart who devoted himself untiringly to the advancement of public health. The State Board of Health of North Carolina was organized in 1877, and eight years thereafter Dr. Lewis was elected a member. Seven years later, in 1892, he succeeded Dr. Wood as the executive officer. Dr. W. S. Rankin, who succeeded Dr. Lewis, makes this statement in the health bulletin of North Carolina, October, 1926, issue:

"In the seventeen years during which Dr. Lewis was at the helm of public health work in this State he exercised such infinite patience, good judgment and rare tact as to afford an example for his successors in office, and he so laid the foundation for public health work in North Carolina as to make what has followed in the years since he resigned (1909) a natural sequence."

Dr. Lewis was progressive, public-spirited, and his abounding energy found expression in building an effective medical and public health organization in his native State, North Carolina.

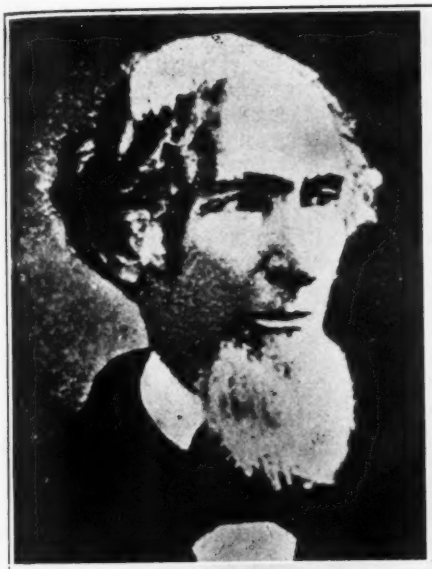
DR. JOSEPH NATHANIEL McCORMACK

One of the outstanding figures in medical organization and public health work during the last half of the Nineteenth and early part of the Twentieth Century was Dr. Joseph Nathaniel McCormack (1847-1922).

"As a practitioner of medicine he was resourceful and self-reliant, an intelligent student; he supplied himself with the best medical books and journals; and with energy and enthusiasm pressed forward to an advanced position in his profession."

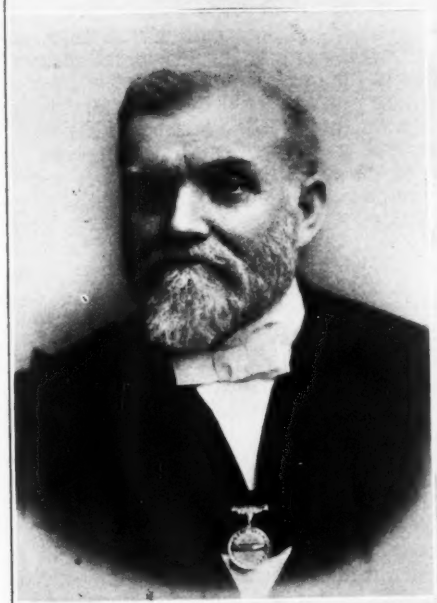
When the State Board of Health was created by the Legislature, which was largely stimulated because of the disastrous prevalence of both cholera and yellow fever during preceding years, Dr. McCormack was appointed a member of the Board. Although he was recognized as an able and skillful practitioner of medicine, he became more and more absorbed in public health work, and in 1883 he was elected Secretary of the State Board of Health. He thereafter gave his time and labor unremittingly to this phase of medical service. He did much during this period (1883-1912) to advance the public health work of his native State. He unified the efforts of the medical profession and set a standard for the improvement of the health service of Kentucky.

One of his greatest achievements was the service which he rendered in organizing the State and local medical societies under the auspices of the American Medical Association. In this capacity he traveled throughout the length and



Josiah Clark Nott
1804-1873

James Lawrence Cabell
1813-1889



Jerome Cochran
1831-1896

Richard Henry Lewis
1850-1926

breadth of the United States, enlisting the interest and support of leaders in his profession in elevating the standards of medical and public health practice. Dr. McCormack was a convincing speaker, an impressive personality and a wise leader.

DR. JOSEPH YATES PORTER

One of the commanding personalities in public health work in the South during the latter part of the Nineteenth Century and the beginning of the Twentieth was Dr. Joseph Yates Porter (1847-1927), who served his native State with remarkable ability during the pioneer period in public health development in this country. He was the first health officer appointed in Florida following the creation of the State Board of Health in 1889. Under his direction Florida was one of the first states to publish and distribute regularly a monthly health bulletin for the people of the State. This publication was sought by health officials because of its interest and the attractive way in which it was prepared. Dr. Porter served as State Health Officer for twenty-seven years and during this period did much toward providing adequate health protection in Florida, not only because of its great humanitarian value, but also because of its intrinsic importance in developing the agricultural and commercial resources of the State.

DR. HENRY ROSE CARTER

A world-wide crusade against malaria began with the discovery by Sir Ronald Ross that this disease is transmitted by the Anopheles mosquito. There is perhaps no disease which is more insidiously destructive and wasteful to human life in semi-tropical and tropical countries than is malaria. It is a problem the solution of which is of the greatest importance in the commercial and industrial development of the Southern states. During the past quarter of a century and especially during the latter part of this period great progress has been made in the control of this disease. The results obtained indicate conclusively that it is only a relatively short time until malaria will be practically eradicated in the southern section of the United States. There is probably no person who contributed more in his time to this outstanding achievement than Dr. Henry Rose Carter (1852-1925), a native of Virginia, and a member of the United States Public Health Service.

It is not only of scientific, but also of much historical interest, that the first demonstration for the control of malaria in the United States in the light of Ross' discovery was begun by Carter in 1913 at Roanoke Rapids, North Carolina, and during the years which followed he was active in promoting the amazing progress in the control of malaria. Dr. Carter's long experience in dealing with this problem and his accurate and extensive information made his service invaluable as an adviser and worker in this field. No man was more capable of expressing the correct point of view in the solution of malaria problems than was this learned sanitarian. Dr. Carter was placed in charge of antimalaria measures for the Public Health Service during the years 1917-1918 with particular reference to the control of malaria around the cantonments during the World War.

Dr. Carter also devoted a great deal of attention to sanitation in connection with the suppression of yellow fever epidemics and he was recognized as an authority on this subject. Indeed, he served in every yellow fever epidemic which occurred in the United States from 1879 to 1904 with but one exception; namely, the epidemic of 1888. It is of interest to note that he made observations concerning the extrinsic incubation period of yellow fever near Orwood, Mississippi, during the epidemic of 1895, and this discovery proved invaluable and gave direction to the investigation of Reed in his work on yellow fever in 1900. Because of his long experience he was made a member of the Rockefeller Yellow Fever Commission in 1919. It may be truly said that Dr. Carter was a great benefactor to the South in the upbuilding of the public health.

DR. WALTER REED

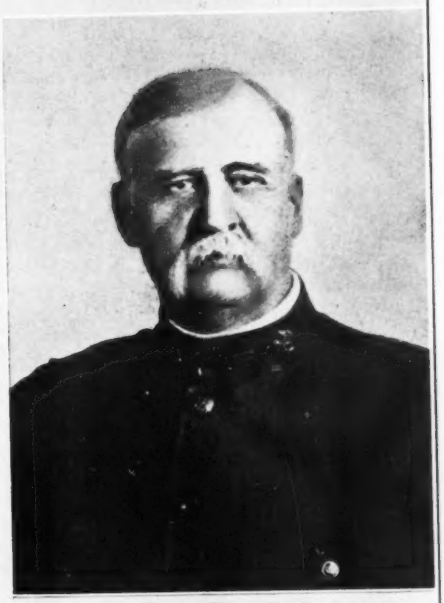
There is no more thrilling or dramatic story than that of the discerning of the mode of transmission of yellow fever by Dr. Walter Reed (1851-1902) and his associates. He was an illustrious son of Virginia, and graduated from the Medical School of the State University when only eighteen years of age.

After a varying experience of eighteen years, chiefly on the Western frontier, Major Reed was detailed to Washington in 1893 as curator of the Army Medical Museum and Professor of Bacteriology in the Army Medical School. As he was a man of scientific training and splendid judgment, he was not infrequently assigned to the Army camps to investigate the cause of epidemic outbreaks, especially of typhoid fever, and to make sanitary inspection. His work during the Spanish-American War as chairman of the commission to investigate typhoid fever at

Joseph Nathaniel McCormack
1847-1922

Joseph Y Porter
1847-1927

Walter Reed
1851-1902



Henry Rose Carter
1852-1925

Camps Alger, Chickamauga and Jacksonville is well known.

In June, 1900, Major Reed was detailed to Cuba to study the etiology and mode of transmission of yellow fever. Starting with the unproved theory of Dr. Carlos Finlay, of Havana, that yellow fever was conveyed by a certain type of mosquito, and aided by the valuable observations of Dr. H. R. Carter as to the extrinsic incubation period of yellow fever, Walter Reed made an exhaustive investigation of this subject, which resulted in an epoch-making victory for medical science. This discovery made it possible to suppress a disease which appeared to be an unconquerable foe of mankind.

It is well to note the significance of this result in the conservation of the public health and in industrial progress in the Southern states and in all tropical and semi-tropical countries. Yellow fever invaded this country as many as ninety times, carrying death and destruction and leaving poverty and grief in its path. For example, there was incalculable loss from an economic standpoint to the United States, and particularly to the South, as a result of the devastating epidemic of 1878. It was estimated that this epidemic cost not less than $15,000,000; but the anxiety, depression, suffering, panic, fear and the untimely loss of human life could never be adequately measured. The discovery of the mode of transmission of this disease by Dr. Walter Reed has probably been a more potent factor in creating and stabilizing the confidence of the public mind in modern preventive medicine than any other one discovery in medical science. The name of Walter Reed will go down in history with the immortals—Jenner, Pasteur, Koch and others.

DR. WILLIAM CRAWFORD GORGAS

The greatest sanitarian of his day was Dr. William Crawford Gorgas (1854-1920), of Alabama, who was an Honorary Fellow of the Royal Society of Tropical Medicine and Hygiene. His achievements are too numerous for me to relate in detail. It was Gorgas who applied the knowledge gained by Reed and his co-workers; it was Gorgas who cleaned up Havana and rendered the construction of the Panama Canal possible. It may be said, however, that even with all of his administrative and scientific ability he would have failed at Panama had not Theodore Roosevelt been behind him. Dr. William Gorgas was a great executive whose success was based on a broad scientific and medical experience. He won renown as Surgeon General of the Army during the World War, and following his retirement from the service he was chosen by the Rockefeller Foundation to serve as chairman of the commission to investigate the epidemiology of yellow fever in Africa. It was while he was en route to assume this responsibility that he became ill and died in London on July 4, 1920. He possessed in a remarkable degree a winning and convincing manner. It was said by Sir Andrew Balfour that,

> "When his coffin was borne up the aisle of St. Paul's Cathedral, the greatest possible tribute was paid to his memory by Great Britain, and the only wreath which rested on the coffin lid was that sent by Sir Patrick Manson, the father of modern tropical medicine, who was soon to follow him into the shades."

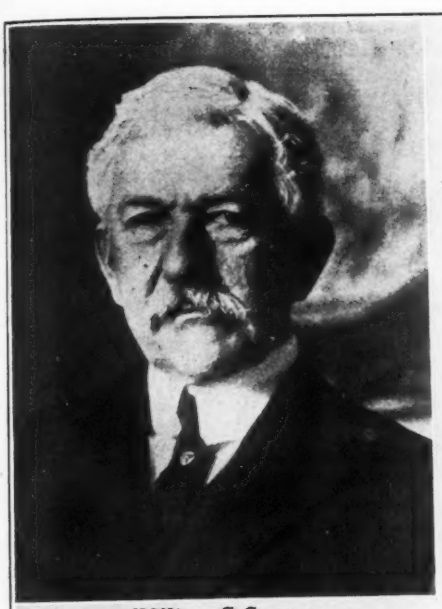
His faith in God and Eternity was absolute. Like Pasteur, he believed that "power for good given to us in this world will be continued beyond it."

DR. WICKLIFFE ROSE

The inauguration of the campaign in 1909 for the prevention and control of hookworm disease in the Southern states as a result of the beneficent gift of John D. Rockefeller initiated a new era in public health work not only in the South, but also in the remainder of the United States and other countries of the world. The most significant step taken in the organization and promotion of this campaign was the selection of Dr. Wickliffe Rose (1862-1931), a native of Tennessee, as the administrative secretary. Dr. Rose developed a new plan of cooperation with state and local health agencies and created a new conception of individual and community responsibility in the control of preventable diseases and in the promotion of public health. His task was to develop a plan to determine the distribution and importance of hookworm disease and to institute control measures for its prevention and ultimate eradication.

He recognized the sovereignty of each state in outlining the procedure for dealing with the hookworm problem. He realized that it was in the interest of both economy and efficiency that this work be done as far as possible through and in cooperation with existing health agencies. He also had a keen appreciation of the contribution which the medical profession could make in this great undertaking. He was a great believer in teaching the people by demonstration; he had a keen appreciation of the experimental method in determining the best procedure for field work in public health.

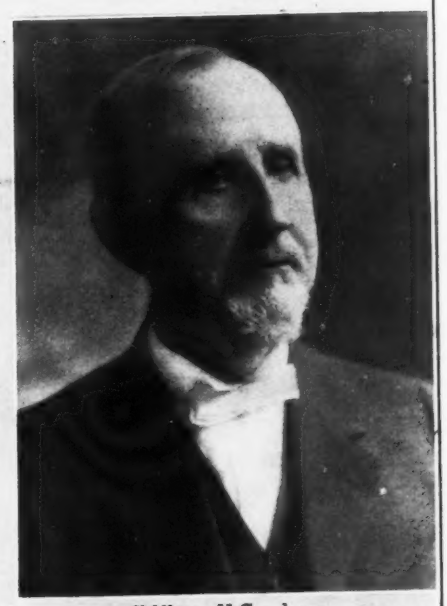
Dr. Rose early came to the conclusion that if public health work is to be permanent and hook-



William C. Gorgas
1854-1920

Wickliffe Rose
1862-1931

Thomas B. McClintic
1873-1912



William H. Sanders
1838-1918

worm disease ultimately eradicated, there must be provided in each county or in a district a capable all-time health officer. The establishment of this principle naturally led to the growth of full-time county health departments. He gave wise and substantial direction to the larger participation of governmental agencies in the field of sanitary science. He exerted a powerful influence for the promotion of the public health not only in our own country, but also in other countries of the world.

Those who were associated with Dr. Rose in public health work honor and revere his memory because of his gracious and inspiring personality; his sympathetic and kindly interest; his sound leadership; his genuine spirit of service; and because of the great and enduring contribution, national and international, which he made in the field of public health.

DR. THOMAS BROWN McCLINTIC

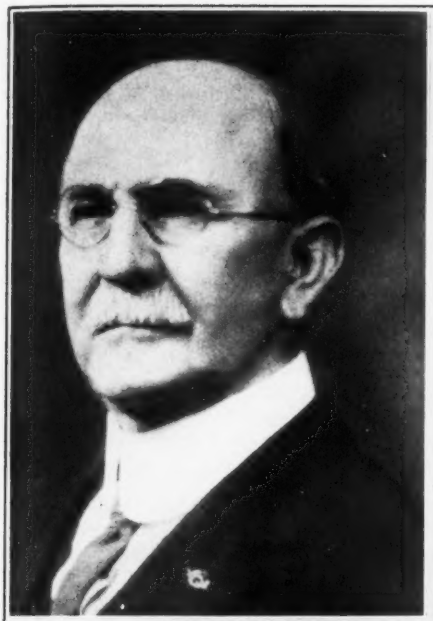
One of the great scourges of mankind is Rocky Mountain spotted fever. Although more or less restricted in locality it gains an appalling aspect by the fearful mortality caused by it. The mode of transmission of the malady was discovered by Ricketts in 1896. It remained for Dr. Thomas Brown McClintic (1873-1912), a Virginian, to make a careful investigation as an officer of the United States Public Health Service as to the best measures to be employed in the complete control of this disease in heavily infected localities. He became an authority on Rocky Mountain spotted fever and while completing his highly successful work in Bitter Root Valley he was bitten by a tick infected with this disease and died a martyr to the cause of scientific medicine on August 13, 1912, in Washington, D. C. He was a man of unassuming manner and his tact and consideration for others made him popular even as a quarantine officer.

DR. WILLIAM HENRY SANDERS

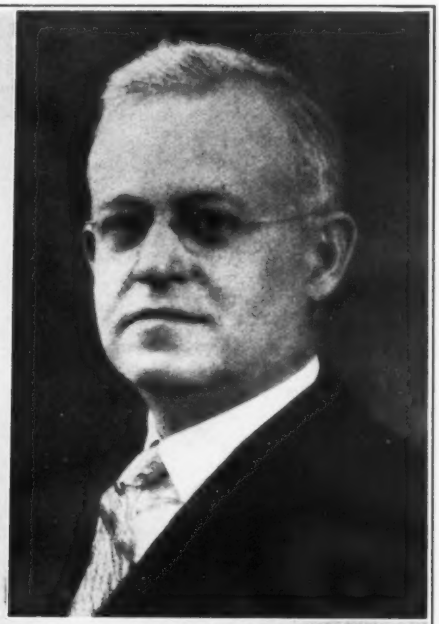
The medical and public health organization of Alabama, which was established by Dr. Jerome Cochran, was stabilized by Dr. William Henry Sanders (1838-1918), who was appointed as the second State Health Officer of Alabama on August 28, 1896. He graduated from the University of Alabama in 1857 with the degree of Bachelor of Arts and later he obtained his medical degree from Jefferson Medical College. He was one of the most notable figures in public life of Alabama. Dr. Sanders possessed remarkable courage in meeting the obligations imposed upon him in connection with his official duties. He stood consistently for high standards in achievement. In days of stress he not only gave his energies unstintingly, but it is recorded that he also provided his personal funds at times when the appropriation for state health work proved inadequate. Dr. Sanders was a man of vision and he commanded the confidence and respect of those who were associated with him. He made a definite contribution in maintaining and upbuilding the public health organization of Alabama. Dr. Sanders resigned as State Health Officer of Alabama on January 9, 1917.

DR. SAMUEL WALLACE WELCH

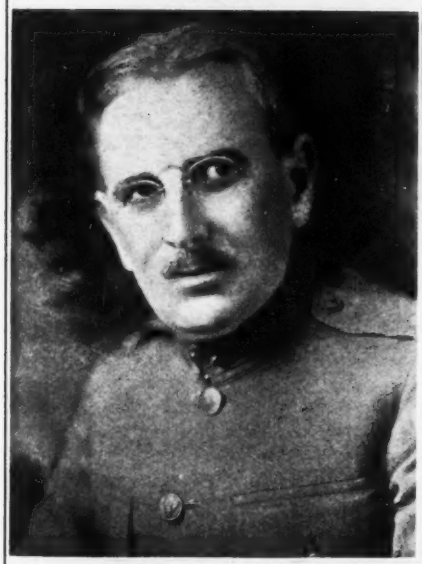
Those charged with the selection of his successor realized that they would not do their full duty by the people of the State unless they selected at that critical period in public health work a man whose education, experience and character were such as eminently to qualify him for the position. Thus it was that Dr. Samuel Wallace Welch (1861-1928) was chosen as Health Officer of his native State, and well did he meet every expectation of his official associates. Much could be written of the remarkable progress which was made in the upbuilding of the State health organization of Alabama during Dr. Welch's administration. It is given to but few men to possess the outstanding leadership of Dr. Welch. In the natural course of events his Sundays were supposed to be spent with his family in Talladega, but little did they see of him. Although Dr. Welch accepted the position of State Health Officer late in his professional career, he showed remarkable adaptability in the application of modern principles to the development and maintenance of an efficient state health organization. The most significant development during his administration and for which he stood preeminently was the creation of full-time county health departments. During the relatively limited period of his service as State Health Officer he was so successful in this respect that at the time of his death Alabama occupied the enviable position of having the largest number of counties organized on a full-time basis, and it also occupied first place among the states in the percentage of rural population protected by full-time public health service. Much could be said about the fine personal qualities of this pioneer in the field of public health, but it is sufficient to state that his achievements justify one in according to him the title, "Public Health Statesman."



Samuel Wallace Welch
1861-1928



Ennion G. Williams
1874-1931



John Samuel Fulton
1859-1931

Oscar Dowling
1866-1931

DR. ENNION GIFFORD WILLIAMS

The passage of a bill in 1908 by the General Assembly of Virginia to reorganize the State Board of Health provided for the appointment of a commissioner of health on a full-time basis. Because of his peculiar qualifications, Governor Swanson insisted upon the appointment by the State Board of Health of Dr. Ennion Gifford Williams (1874-1931) as the first Commissioner of Health of the Commonwealth. He served in this capacity continuously from 1908 until his death on June 6, 1931.

The establishment of the State Department of Health of Virginia was accomplished after tremendous effort on the part of those who were interested in this important development. Dr. Williams was the guiding spirit in its establishment and his creative ability was the inspiration for the necessary legislation. The ability to discriminate between the essential and nonessential, and a sense of proportion were possessed by Dr. Williams in a remarkable degree. He made a definite contribution in developing a plan of health education both with reference to the public school system and the public at large. He was a pioneer in the development of sound principles of administration in state and local health organizations. The great service which Dr. Williams rendered to the people of his native State in the prevention and control of disease and the advancement of public health is a lasting monument to his fine leadership and genius for organization.

DR. JOHN SAMUEL FULTON

It would not be possible to recount the achievements of pioneers and leaders in public health without giving consideration to the great service which was rendered by Dr. John Samuel Fulton (1859-1931), who was the first full-time director of the State Health Department of Maryland. He was appointed State Health Officer in 1896. He served in this capacity until 1928 with the exception of periods during the interval between 1907 and 1913, when he was called to Washington to organize the Sixth International Congress on Tuberculosis of 1908 and the Fifteenth International Congress on Hygiene and Demography of 1912. He also served as a member of the staff of the Surgeon General of the United States Army during the World War. In the Bulletin of the Maryland State Department of Health the following notable statement is made:

"Dr. Fulton's career was inseparably associated with the development of public health in Maryland. Soon after he was made State Health Officer he was instrumental in securing the appointment of Dr. William H. Welch as a member of the State Board of Health and subsequently its President. Dr. Welch continued in his connection with the Board until May, 1929, when he resigned because of the pressure of other duties. The progress made by the State Department of Health during these years was largely due to the initiative and fine leadership of Dr. Fulton, reenforced by the active interest and support of Dr. Welch in every phase of public health service."

He was actively identified through all of his professional career with the Conference of State and Provincial Health Officers, of which he served as President in 1905. Dr. Fulton exerted a strong influence for the prevention of disease and promotion of health not only in Maryland, but also the impress of his vivid personality, his courage and his vision were felt far beyond the borders of his own State.

DR. OSCAR DOWLING

One of the outstanding needs in the Southern states about 1910 was the improvement in general sanitation in towns and cities. No one contributed a larger service in emphasizing its importance and in developing sound administrative practice in dealing with community sanitation than Dr. Oscar Dowling (1866-1931), who was made a member of the State Board of Health of Louisiana in 1906 and later appointed State Health Officer. He served most efficiently in that capacity, beginning with 1909, for eighteen years. One of the first activities which were undertaken by Dr. Dowling was to institute an aggressive campaign for cleaning up places of public utility in New Orleans and other cities of major importance in the State. He achieved remarkable success not only in impressing the people of his State with the importance of sanitation of the environment, but also his efforts in this respect had a beneficial influence throughout the entire country. The Health Department of Louisiana was in a backward condition when Dr. Dowling became its administrative head, but he was successful to the extent of making it one of the foremost states in the Union in public health achievement. His outstanding achievements were the creation of the Bureau of Vital Statistics as well as other divisions of service, the establishment of higher standards in producing and handling milk, the improvement of public markets, and the education of the public on health questions, particularly by the use of exhibits and a well designed health car in which he traversed the entire State. Dr. Dowling exerted a national influence for the improvement of public health conditions, and he also made a

definite contribution in the advancement of organized medicine.

COMMENT

The progress made by those who have transmitted to us such a rich heritage of achievement should be a beacon light to guide us into channels of greater usefulness and a more beneficent service. In this time of crisis, indomitable energy, intelligent leadership and confidence in the eternal value of the task undertaken will not only enable us to maintain the ground gained, but also will lead to a sustained growth, a larger and sounder development and a more permanent achievement.

BLASTOMYCOSIS OF BONE*

By D. B. HARDING, M.D.,
and
CHAS. C. GARR, M.D., F.A.C.S.,
Lexington, Ky.

Blastomycosis, a disease caused by a group of vegetable parasites known as blastomyces, was first reported in 1894 by Gilchrist, who found the organisms in a section taken from a skin lesion thought to be scrofuloderma. Later in the same year, Busse reported a case of a fatal generalized yeast infection which followed an abscess in the tibia. Since then, various forms of the disease have been reported from all sections of the country and many other parts of the world.

Blastomyces are yeast-like fungus cells of the group known as *fungi imperfecti*. They are round or oval highly refractile bodies, from 5 to 20 micra in diameter, surrounded by hyaline capsules. It is still undetermined whether one or more forms cause the disease in man. Castellani (quoted by Jacobson), after extensive research in this field, believes that there are several species, and he has been able to isolate three distinct divisions. The organisms may be demonstrated by mixing a drop of pus from a lesion with a drop or two of a 10 to 30 per cent solution of sodium or potassium hydroxide on a glass slide. The budding forms identify them as blastomyces. In tissue sections, they may be seen within giant cells or throughout the granulation tissue.

Little is known of the predisposing causes of the infection, but the laboring classes especially are subject to the disease. Fifty per cent of our cases were in farmers or farm laborers who handled tobacco. All were adults, the youngest 35 years of age and the oldest 72, with an average age of 57 years. Seventy per cent were males. Seventy per cent were white and the remainder colored. This is in agreement with the local population ratio of the two races, suggesting equal susceptibility. Stober states that environment plays a predominating role, as he has recovered organisms resembling blastomyces from the walls and floors of the habitations of some of his patients.

We have seen one case in a man who lived with a patient dying of systemic blastomycosis. In this case, local lesions appeared on the face following cuts while shaving. Here the portal of entry was undoubtedly the skin, but the high incidence of pulmonary involvement indicates that the infection may enter through the respiratory tract.

In the systemic form of blastomycosis, any tissue in the body may be attacked. Wade and Bell report 27 cases, with involvement of the lungs in 96 per cent, the skin in 89 per cent, and the bones in 59 per cent. Although bone involvement is frequent, the literature until recently has given very meager descriptions of the osseous lesions. However, Stober, in 1914, in an extensive review of the subject, quotes Hollis E. Potter in a detailed report of the x-ray findings noted in the Cook County Hospital, where a large number of cases have been seen.

The primary bone lesions are almost certainly hematogenous in origin, with an unknown portal of entry. In one of our cases, the patient developed evidence of extensive pulmonary involvement while under observation for an infection in the foot. Which was actually the primary lesion, of course, could not be determined. However, other patients showed only localized lesions in the bone and surrounding soft tissues, without demonstrable evidence of infection elsewhere during the course of the disease. The bone lesions also follow other localized infection, usually in the skin or lungs. The bones of the extremities, and especially of the hands and feet, are most often involved.

Clinically, the patients present one constant symptom at the onset. That is pain, coming on suddenly, and usually without a history of

*Read in Section on Radiology, Southern Medical Association, Twenty-Sixth Annual Meeting, Birmingham, Alabama, November 15-18, 1932.

injury. Only one of our patients gave a history of minor injury to the affected part preceding the onset of the pain. The pain is constant, but worse at night. In our cases there were no subjective febrile symptoms and little or no elevation of temperature, unless the bone involvement was part of a systemic infection. In the systemic cases the temperature curves were quite irregular, ranging between normal and 100 to 102°. In one patient acutely ill with extensive pulmonary involvement, the temperature reached 104° on one day only, just before death occurred.

Redness and swelling appear in the affected area usually during the second week, and the pain decreases. Practically all of our patients had had spontaneous or surgical drainage within a few weeks after the onset of symptoms. However, one had an infection in the foot for six months before surgical incision was done. Draining sinuses persist, with little or no tendency to heal. The blood count is usually normal, with the leucocytes between 8,000 and 10,000, although Jacobson says they may reach 40,000.

The radiographic findings are variable, with only one feature which is almost constant, and which was found in most of our cases. This is the presence of quite a sharp line of demarcation between the involved areas and the adjacent normal appearing bone. In the short bones, single or multiple areas of complete destruction are seen, involving chiefly the central portions of the bones. Where the lesions are close to articular surfaces, a thin shell of bone may remain beneath the cartilage; or the joint may be entirely destroyed, with extension into the articulating bone. Marked osteoporosis may make it difficult to determine the exact extent of involvement.

In the long bones, the extremities are affected primarily. Early lesions may show periostitis or central necrosis, alone or in combination. The disease may remain in a single bone, with varying degrees of involvement, or may extend into and beyond the joints as in the short bones. Multiple adjacent foci usually coalesce, presenting a multilocular appearance. The periostitis may be quite extensive, forming a thick shell of homogenous bone around the shaft. However, this is not constant, as we could demonstrate no proliferative changes in some of our cases. In one, a patient with systemic blastomycosis and pulmonary tuberculosis, there was extensive destruction of the entire shaft of the humerus, with a pathological fracture. Except for the extent of the involvement, it resembled metastatic carcinoma more than an inflammatory process.

In the past six years, 16 cases of blastomycosis have been seen in the Lexington Clinic. Eleven cases showed bone involvement. One of these has been reported elsewhere by one of us. The remaining ten cases are reported as follows:

Case 31607.—A colored man, age 51, a farm laborer, had had several small hard nodules in the skin of the fifth finger, with some ulceration, for two years. A year after the onset, the finger became markedly swollen, with some pain, followed by a draining sinus which persisted. Several draining sinuses in the forearm appeared later (*Fig. 1-A*).

Radiographic examination of the hand and forearm showed an extensive, irregular, very sharply defined area of complete destruction in the proximal phalanx of the fifth finger, extending close to the distal end of the bones, but not involving the articular surface. There was no new bone formation (*Fig. 1-B*).

The patient was given large doses of potassium iodide, with temporary healing of the cutaneous lesions. A year later the sinuses had reopened and there was a large swelling in the axilla. Repeated x-ray examinations during this year showed practically no change in the involved bone. The patient did not return for further observation.

Case 26641.—A white woman, age 60, stated that three months previously her thumb began to ache and swell. Surgical incision several weeks later relieved the pain, but the swelling and a draining sinus had persisted. Examination revealed marked swelling over the

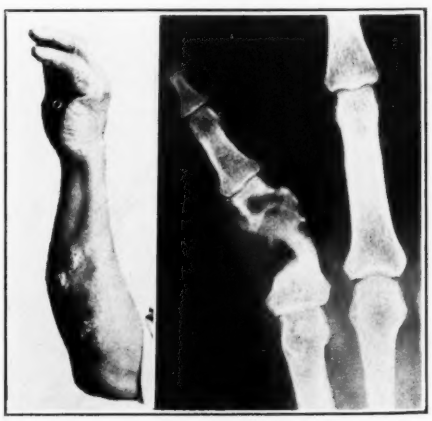


Fig. 1-A Fig. 1-B

Fig. 1-A—Blastomycosis of skin and subcutaneous tissues of hand and forearm. Note swelling of fifth finger, where the phalanx was involved (See Fig. 1-B).

Fig. 1-B—Blastomycosis of the phalanx. Note typical sharp demarcation of the osteolytic process.

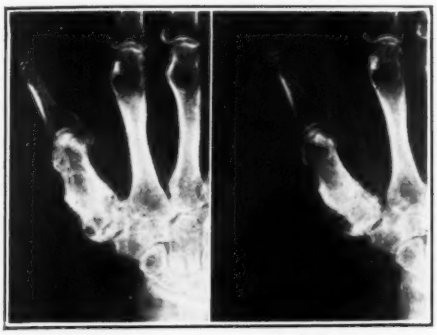


Fig. 2-A Fig. 2-B

Fig. 2-A and B.—Blastomycosis of the first metacarpal, showing multiple coalescing areas of destruction, limited by the articular surfaces at the ends of the bone, and marked improvement in the appearance of the bone after three months' treatment.

first metacarpal, with an ulcerated lesion in the skin. Radiographic study showed multiple rather sharply circumscribed coalescing areas of destruction throughout the first metacarpal, with some new bone formation (*Fig. 2-A*). Blastomycosis was suggested by the radiologist, and blastomyces were found in pus from the superficial lesion. With potassium iodide therapy, the sinus was healed in three months, and an x-ray examination at that time showed marked improvement in the appearance of the metacarpal (*Fig. 2-B*).

Case 35205.—A white man, age 59, a painter, suddenly developed pain in the right forearm, followed in a few days by redness and swelling. Surgical drainage a month after the onset had relieved the pain, but draining sinuses persisted. Examination three months after the onset revealed four large ulcerated lesions on the forearm, from which thin pus exudated on pressure.

The blood count was normal. The blood Wassermann was negative. Radiographic examination of the forearm showed some osteitis and periostitis of the radius, without definite osteolysis. Blastomyces were demonstrated in the purulent exudate.

The rapid appearance of the soft tissue swelling and the absence of bone destruction suggested that this was primarily a soft tissue infection. The bone changes were such as would be expected to follow any pyogenic infection in the periosseous tissues, and were not characteristic of blastomycosis.

The family physician reported improvement soon after potassium iodide therapy was begun. Now, eighteen months later, he writes that the patient is well and working.

Case 23765.—A white woman, age 69, suddenly developed pain in the foot, followed by redness and swelling. A diagnosis of acute arthritis was made, but the symptoms persisted, and finally the family physician incised an abscess that had become evident. A second examination in the Lexington Clinic, two months after the onset, revealed marked tenderness and swelling of the entire foot, with a draining sinus over the fifth metatarsal on the dorsum of the foot. Radiographic examination showed almost complete destruction of the fourth metatarsal, and similar less extensive involvement of the proximal ends of the other metatarsals and the anterior tarsals (*Fig. 3*). The involved areas were not sharply defined. All the bones of the foot showed osteoporosis.

Some albumin and hyaline casts were found in the urine, but the same findings had been reported before the infection in the foot occurred. The blood count was normal.

The clinical examination suggested blastomycosis at this time, and the organisms were found in pus from the sinus in the foot.

With potassium iodide therapy, the sinus closed in five months, and the patient began using the foot in walking.

Case 20462.—A white man, age 72, a farmer, complained of sudden pain in the outer side of the ankle. The pain had been continuous, of ten days' duration, but was subsiding. Physical examination showed redness, swelling and tenderness over the external malleolus. Radiographic examination showed only a questionable area of destruction in the malleolus.

A surgical incision revealed free pus in the soft tissues and an abscess in the malleolus, which was curetted. A persistent draining sinus finally suggested the possibility of blastomycosis, and blastomyces were found in pus from the sinus.

Potassium iodide therapy produced immediate improvement, with complete healing in six months. Five years later there had been no recurrence.

Case 21162.—A white man, age 56, a farmer, developed pain in the foot, followed in two weeks by redness and swelling. Several incisions for drainage, including removal of dead bone, were done during the next few months. An examination at the Lexington Clinic five months after the onset showed a large ulcerated lesion on the dorsum of the foot. The blood count was normal. Urinalysis showed a little albumin and a few hyaline casts. An x-ray examination of the

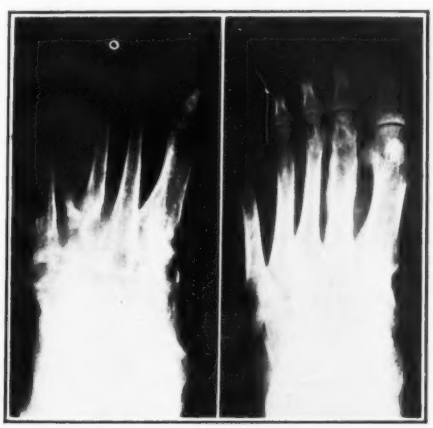
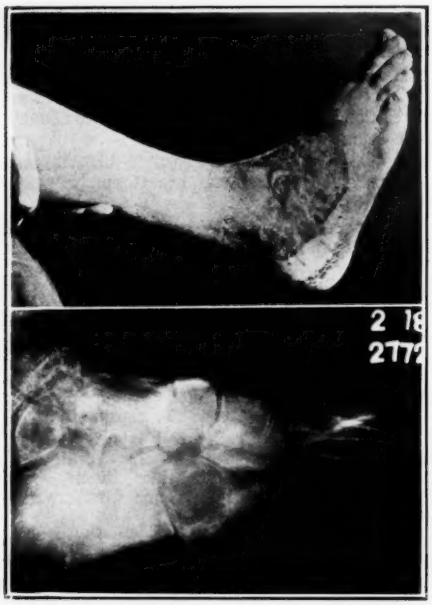


Fig. 3 Fig. 4

Fig. 3.—Extensive blastomycotic destruction of the bones and joints of the foot, without the characteristic sharp demarcation of the involved areas.

Fig. 4.—Blastomycosis of the second metatarsal, with a medullary abscess and cortical thickening, resembling chronic pyogenic osteomyelitis.



Top—Fig. 5-A
Bottom—Fig. 5-B

Fig. 5-A.—Cutaneous blastomycosis (See Fig. 5-B).

Fig. 5-B.—Blastomycosis of the tarsal bones, showing especially the large rather sharply outlined abscess in the cuboid.

foot showed a lesion of the distal half of the second metatarsal bone, with marked cortical thickening and a medullary abscess (*Fig. 4*). This was thought to be an ordinary chronic osteomyelitis.

The clinical examination suggested blastomycosis, and examination of pus from the ulcer on the foot proved this to be correct.

Potassium iodide was prescribed. The patient did not return for further observation.

Case 27729.—A white man, age 45, a farmer, presented the following history: seven months previously, two boils appeared on the anterior surface of the thigh, opening spontaneously. He was unable to keep a dressing over the lesions and his overalls rubbed them constantly while he was working. A short time later his entire foot became swollen and painful. Six months after the onset the foot was incised. Draining sinuses have persisted in the foot and in the thigh.

Examination revealed extensive ulceration of the skin around the entire ankle and posterior portion of the foot; marked swelling of the entire foot; and draining sinuses in the foot and anterior surface of the thigh (*Fig. 5-A*). The blood count was normal. An x ray examination of the foot showed multiple large areas of destruction in most of the tarsal bones, involving chiefly the central portions of the bones, but with some destruction of the articular surfaces also. The areas of involvement were rather sharply defined. All the bones of the foot showed osteoporosis (*Fig. 5-B*).

A clinical diagnosis of blastomycosis was confirmed by demonstration of the organisms in pus from the lesion in the foot.

Potassium iodide therapy was followed by some improvement in the pain in the foot, but amputation was advised. This was done elsewhere, following which the sinuses in the thigh closed and the patient was apparently cured.

Case 22067-1661-30.—A white woman, age 65, came to the Lexington Clinic in 1927 because of multiple recurring ulcers on the leg, which had been diagnosed as blastomycosis. She had been treated for pulmonary tuberculosis during the preceding two years. Tubercle bacilli were found in the sputum.

The cutaneous lesions on the leg and the pulmonary symptoms persisted for five years. She was finally admitted to St. Joseph's Hospital, seriously ill, and complaining of pain and swelling in the left arm.

An x-ray examination of the chest showed comp'ete consolidation and extensive cavitation in the left lung

Fig. 6

Extensive osteolysis of the shaft of the humerus in a patient with systemic blastomycosis.

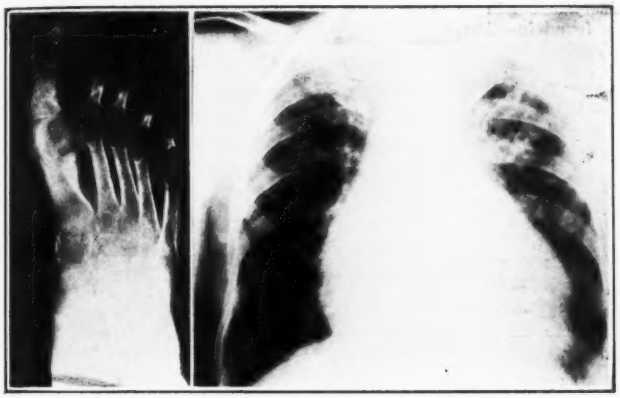


Fig. 7-A Fig. 7-B

Fig. 7-A.—Blastomycosis of the bones of the foot, showing a large abscess in the first metatarsal, a thick shell of periostitis surrounding the shaft, and destruction of the articular surface, with extension into the phalanx.

Fig. 7-B.—Bilateral apical infiltration, typical of a chronic pulmonary tuberculosis. The sputum contained blastomyces, but no tubercle bacilli could be found.

and marked fibrosis throughout the right lung. The humerus showed a very extensive osteolytic process involving the entire shaft, with a pathological fracture, and with no new bone formation (*Fig. 6*).

Examination of the urine showed only a trace of albumin. The patient's temperature never exceeded 100.4° and was normal much of the time. She died two and a half months after admission to the hospital.

An autopsy showed extensive lesions of the skin, the left humerus, and the lungs, with blastomyces present in the pus from all the involved areas. Sections of the lungs showed both blastomycosis and tuberculosis, the latter predominating.

We are indebted to Dr. John McGinnis and Dr. John Lewis for the clinical and radiographic findings of the patient's hospital record.

Case 659-31C.—A colored man, age 53, a barber shop porter, was admitted to St. Joseph's Hospital because of a "boil" on the right foot which had failed to heal following surgical drainage. The infection was of six weeks' duration. Examination revealed a tender painful swelling over the first metatarsal, with two discharging sinuses. An x-ray examination showed some periostitis of the shaft of the first metatarsal. The urine contained a trace of albumin and a few pus cells. The blood count was normal, except for a slight secondary anemia.

The lesion was again incised and a necrotic area in the distal end of the first metatarsal was curetted. There was still no improvement. A second radiographic examination showed increasing periostitis and a rather sharply defined defect in the metatarsal, apparently operative. A third examination, six months after the onset of symptoms, revealed a much larger area of complete destruction in the metatarsal, sharply circumscribed, with a thick shell of periostitis and some involvement of the articulating proximal phalanx (*Fig. 7-A*). This suggested blastomycosis to one of us, and blastomyces were found immediately in pus from the lesion in the foot. A pulmonary infection had developed, with the radiographic appearance of a bilateral apical tuberculosis (*Fig. 7-B*). No tubercle bacilli could be found in the sputum, but blastomyces were present.

Throughout eleven months in the hospital the patient's temperature ranged between 98 and 101°, reaching 102° only once, a few days before death.

Case 866-30C.—A colored man, age 35, came to St. Joseph's Hospital because of pain and swelling in the foot following a minor injury. He had had a chronic cough with expectoration and an occasional hemoptysis for a year previously. Ulcers on the face, arms and abdomen had appeared during the past six months.

Blastomyces were found in the cutaneous lesions and in the sputum. No tubercle bacilli were found in the sputum. An x-ray examination of the chest showed extensive infiltration in the mid portion of the right lung and in the left base (*Fig. 8*). The foot showed slight periostitis of the shaft of the fourth metatarsal.

Examination of the urine was negative. The blood Wassermann was negative. The patient had a temperature elevation of the septic type, ranging between 99 and 104°. He died 2½ weeks after admission to the hospital.

An autopsy revealed the cutaneous lesions mentioned above; diffuse consolidation and miliary infiltration

Fig. 8

Extensive areas of consolidation in the lungs, associated with an acute systemic blastomycosis.

without cavitation in both lungs; and miliary lesions in the liver and kidneys. Blastomyces were found in all these lesions. The foot was not examined.

Reviewing these cases, we find that at the onset the picture is that of an acute osteomyelitis. The only differentiating features are the mild febrile reaction and the absence of a leucocytosis. In the absence of cutaneous lesions characteristic of blastomycosis, there is nothing to suggest the type of infection. Later on, after drainage has been established, the persistent sinuses, together with more or less characteristic radiographic findings in some cases, suggest a search for blastomyces.

A chronic course, frequent joint involvement, and pulmonary lesions always suggest tuberculosis. Even the gross and microscopic examination of the infected tissues may be confused with tuberculosis, as has been stressed by Medlar and others. The presence of a positive Wassermann reaction may serve only to confuse the diagnosis. Coccidioidal granuloma can be differentiated only by laboratory methods. Actinomycosis seldom involves bone, and then the lesions are usually limited to the vertebrae.

The one important factor in the diagnosis of blastomycosis is to consider it as a possibility, for the organisms are easily found in pus from the infected tissues and are readily identified by laboratory examination. Successful treatment of blastomycosis apparently depends on the extent of the disease. All of our cases with pulmonary or systemic involvement were fatal. In 7 cases the disease was limited to the bones and soft tissues of a single extremity. These 7 patients were given potassium iodide in increasing doses, with gratifying results. One patient failed to return for observation. The remaining 6 all showed marked improvement within a short time after treatment was begun. One required amputation of a hopelessly involved foot, following which multiple sinuses in the thigh healed promptly. Another patient, a negro, improved temporarily, but a year later had a recurrence of his draining sinuses. There was some question here of how faithfully the potassium iodide had been taken. Four patients apparently were cured within three to six months. One of these was seen five years later, with no recurrence.

SUMMARY

Blastomycosis of bone occurs as a primary infection, or secondary to lesions elsewhere in the body, usually in the skin or the lungs.

Clinically, the disease resembles acute osteomyelitis at the onset, and chronic osteomyelitis and tuberculosis after it becomes chronic.

Radiographically, some cases present findings which may suggest the correct diagnosis.

The final diagnosis is made by the demonstration of blastomyces in the infected tissues or their exudates.

Treatment with large doses of potassium iodide cures a large percentage of the localized lesions. The generalized infections are fatal.

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DISCUSSION (*Abstract*)

Dr. H. Earle Conwell, Fairfield, Ala.—The importance of thorough examinations of the pus or of sections from infected wounds of obscure origin cannot be over-emphasized. We should be more observant of chronic wounds or ulcerations, and if we are, I am sure that blastomycosis as the etiological factor will be found to be more frequent.

We have had two cases of blastomycosis of bone at the Employees' Hospital, Fairfield, Alabama. One patient was a white boy, age 7, who gave a history of falling on his right shoulder without any previous or known pathological condition in that area. He reported to the Orthopedic Clinic and a diagnosis of a fracture of the middle third of the right clavicle was made. Further examination showed a definite fluctuating mass over the middle third of the right clavicle; also definite crepitation was made out over the fluctuating mass.

Radiological examination showed a pathological fracture of the middle third of the right clavicle. A fluctuating mass was incised and drained, and only a small amount of pus was found. Blastomycetes were found in the pus. Potassium iodide was given in this case with practically no beneficial temporary results and certainly no permanent relief. The patient gradually became worse, infection spreading to the right scapula and head of the humerus. He later developed a bilateral pulmonary involvement with systemic infection, and died.

I should like to ask Dr. Garr about the dosage of potassium iodide in these cases.

Dr. C. H. Heacock, Memphis, Tenn.—I have treated a case of blastomycosis of bone with the roentgen rays, and felt that this method was a valuable adjunct to the iodides.

TANNIC ACID TREATMENT OF BURNS*

By J. D. MARTIN, JR., M.D.,
Atlanta, Ga.

Although the tannic acid treatment of burns has been fairly well established as a routine in some of our larger centers, there are many physicians who have not accepted it as a method of choice. It has now been seven years since Davidson[1] first advocated its use. There have been a few minor modifications of the method by the many men who have used it. With the widespread employment of the treatment, a proper evaluation of its efficacy is obtained.

Tannic acid is not itself sufficient for the care of a burn. It was at first thought that by spraying the burned surface with tannic acid a coagulum would form which would fix the split protein products that caused the toxic effects. It has been proven that this is not true, since many patients develop toxic symptoms even after its use. However, the development of these symptoms is usually delayed, and they are less marked than following other procedures. The principles of the local treatment of burns have been, first, to exclude air from the surface of the skin, thereby to lessen the pain; second, to prevent and restore the loss of body fluids and thus minimize the likelihood of toxicity. It is felt that, with large burns which involve at least 10 per cent of the body surface, the results from tannic acid treatment alone would be the same as from other procedures without the use of saline, glucose and other fluids.

The role that saline plays is thus one of considerable importance. As has been shown by many workers,[2 3] there is a lowering of the chloride content of the blood; also there is an anhydremia manifested by an increase in the hemoglobin and the total erythrocyte count. The variation of chloride and fluid loss is dependent on the degree and extent of the burns. It has been found, however, that with the use of tannic acid to form a coagulum on the burned surface the blood constituents remain more nearly normal unless the involvement is extensive and early toxic symptoms are present. The purpose of saline is, therefore, to replenish the loss of fluids and to increase the chloride content of the plasma. Glucose and saline also aid in combating the nausea and vomiting which are usually present.

In minor first degree burns, after the surface has been tanned, it is not necessary to remove the coagulum from the surface until epithelialization has taken place. In deeper and more extensive involvement there is necrotic tissue underneath the coagulum and this must be removed before healing takes place by granulation. Tannic acid is thought to hasten or stimulate epithelialization, but it is impossible to expect healing in deep burns by any process other than that of granulation. The coagulum in these lesions must be removed gently from the eighth to the tenth day to begin preparation for grafting. In deep burns, pus and necrotic material will usually collect underneath the tanned surface and unless drainage is obtained, there will be a general manifestation of sepsis. In an unpublished report it is found that tannic acid is bactericidal for the common micro-organisms in 10 to 20 per cent solution, but at these strengths the effect of the tannic acid in producing a coagulum is not so great as it is in 2.5 to 5 per cent solutions, the ones generally used. The value of local germicides is questionable because of the failure of penetration to any depth, and also because the true corium is necrotic and must slough off before healing takes place. Germicidal agents have been added to tannic acid, particularly the tragacanth suspensions, but a freshly prepared sterile aqueous solution will produce the same germicidal effect.

The mortality from burns following the use of tannic acid has been very materially decreased as shown by the reports of many writers. Beekman,[4] of New York, reports a reduction from 27.8 per cent to 14.9 per cent; Bancroft and Rogers[5] from 40 to 50 per cent to 20 per cent. Glover[6] reports a reduction from 14 to 9.6 per cent. These results appear to be considerably better than those obtained in my series. The mortality for the last 80 cases was 26.9 per cent as compared to a percentage of 30.2 for an equal number treated by other procedures. This figure apparently is high and it may be partially accounted for by the fact that the patients admitted to the hospital must have had considerable surface involvement. Many of the smaller and less extensive burns were treated in the Out-patient Department. If this number

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*From the Department of Surgery, Emory University School of Medicine.

Fig. 1. Case 1
Extensive burns of about 66 per cent of the body surface. The burned area has been tanned.

Fig. 2. Case 2
Showing extensive involvement and results of the immediate application of tannic acid.

Fig. 3, Case 3
After having been tanned.

Fig. 4. Case 4
Showing involvement of lower abdomen and inguinal region. The tannate is beginning to come away.

were added to the hospital cases the total mortality would be much less.

In the more extensive lesions the use of tannic acid has played only a minor part in aiding the patients. If as much as 50 to 60 per cent of body surface was involved, death usually followed in a short time, but the benefit derived in comfort to the patient warranted its use. The greatest decrease in mortality was noted in the borderline cases where the depth and extent of the burn was not determined at first. There is a great danger in considering any burn insignificant, because immediately after the accident, particularly following scalds, it is impossible to determine the seriousness of the lesion. If all injuries are considered dangerous, regardless of their apparent innocence, the mortality will be reduced.

TECHNIC OF TREATMENT

Immediately after the accident, the first consideration is the treatment of primary shock which is manifested by a rapid pulse, subnormal temperature, cold clammy skin and profuse perspiration. These symptoms are usually constant in severe burns and must be combated

Case 1.—D. M. H., 66 per cent body surface burned. Second and third degree burn of both upper and lower extremities and trunk; gasoline stove set fire. Date of admission, January 14, 1932. Date of death, January 15, 1932, 5:35 p. m.

Blood	First Day	Second Day
RBC	7,360,000	7,660,000
Hb	19.54	.....
WBC	30,750	54,300
NPN	30	.....
Creat	1.2	.....
CL	775.5	.....
CO_2	32.5	25
Urine—		
	Alb. ++++; acid, hyaline and granular casts; pus cells	Acid; alb. ++, hyaline and granular casts

Case 2.—E. S., age 12, admitted January 11, 1932. Second degree burn of left side of trunk, left leg and arm. Burned in open flame. February 11, 1932, transfusion 300 c. c. whole blood. February 20, 1932, P. S. P. kidney function test: first hour, 50 c. c. urine, 10 per cent excreted; second hour, 70 c. c. urine, 15 per cent excreted.

	First Day	Second	Third	Fifth	Ninth	Fourteenth	Twenty-Fifth
RBC	5,650,000	6,960,000	6,430,000	5,280,000	5,340,000	4,440,000	4,500,000
Hb	20.74	15.78	15.78	15.78	10.73	8.42	10.52
WBC	23,100	15,100	21,550	14,450	22,750	15,750	22,000
NPN	35.2	42.8	50	26	22.2	16.4	20
Creat	.6	1.3	1.2	1.06	1.2	1.6	1.4
CL	529	445.5	462	346.5	577.5	369.5	495
CO_2	27.1	21	17.2	39.5	42.1	45	41.1
Urine—	1.029; acid; alb.++; occ. epi cell; occ. hyaline cast	1.028; acid; sugar +++; acetone +; 3 pus cells; occ. red cell	1.026; acid; sugar +; acetone +; 4 pus cells; few epi cells; occ. gran. cast	1.029; acid; alb. ++; 15 pus cells; many cylindroids	1.023; acid; sugar trace; 9 pus cells; few epi cells	Acid; 8 to 10 pus cells	1.018; acid; 3-4 pus cells

Case 3.—B. H., age 35. Second and third degree burn of trunk, upper extremities, neck and face, 58 per cent of body surface. Burned in open flame. Admitted January 2, 1932. Died January 7, 1932.

	First Day	Second	Third	Fifth	Sixth	Seventh
RBC	4,720,000	6,250,000	5,720,000	2,800,000	5,850,000	4,000,000
Hb	6.38	13.19	9.64	7.4	.....	9.02
WBC	15,550	16,100	6,700	2,150	6,200	7,200
NPN	58.2	60	.....	.....	193.5	.....
Creat	1.19	2.3	.....	.....	3.17	.....
CL	297	478.5	.....	.....	381.1	.....
CO_2	57.1	17	16.7	.....	19.3	.....
Urine—	1.015 Alk.; alb. ++++; occ. fine gran. cast; 40 RBC	Alk.; alb. ++++; blood +; epi cells; occ. large gran. casts	Acid; alb. ++++; sugar trace; epi cells; pus +; coarse casts	1.009 Acid; sugar trace; alb. ++++; 5 pus cells		Acid; alb. ++++; 40 pus cells; occ. epi cell

Case 4.—E. L., age 3, 15 per cent of body surface burned. Date of admission, December 2, 1931. Transfusions: December 10, 1931, 300 c. c. whole blood. January 8, 1932, 250 c. c. whole blood. February 8, 1932, 250 c. c. whole blood. Skin graft January 13, 1932., Thirsch.

	First Day	Second	Third	Sixth	Seventh	Twenty-Second
RBC	2,210,000 less than	2,550,000	2,700,000	2,060,000	1,680,000	2,230,000
Hb	7.89	8.57	8.42	6.02	4.1	7.48
WBC	24,400	42,600	41,600	33,000	43,200	18,600
NPN	.....	.....	40	.....	.....	.....
Creat	.....	.....	2.1	.....	.....	.....
CL	.....	.....	528	.....	.....	.....
CO_2	.....	.....	42 per cent	.....	.....	.....
Urine—	Acid; few pus cells; high power	Acid 1.022; 6 pus cells; occ. RBC	Acid 1.008; few pus cells; occ. RBC			

before consideration of the local condition is given. Morphine is administered in doses sufficient to make the patient comfortable, giving at least one-half grain to adults if the burn is of any magnitude, and repeating as often as necessary. The patient is placed in bed without attempting to remove the dirty burned clothing. External heat is obtained in the quickest manner, usually by blankets and an overhead canopy with suspended electric light bulbs. Stimulants are administered early, preferably epinephrine. During the first 24 to 36 hours it is well to continue the use of these stimulants, for it is in this period that the greatest reaction occurs. Saline and glucose are administered routinely. An infusion of 1,000 c. c. of normal saline is given immediately and it is repeated at least every six to eight hours. Occasionally, when we give large quantities of fluids, the patient is not able to take care of this amount. Their administration must then be lessened or discontinued temporarily.

A few cases do better with a transfusion of whole blood, but it is never advisable to resort to an exsanguination transfusion,[7] and in the majority of instances saline by infusion or subcutaneous administration is sufficient.

After the patient has reacted from the primary shock, the local condition is considered. In a warm room, usually under the light tent, the clothes are removed. Frequently a warm tub bath will make the patient more comfortable while this procedure is carried out. The patient is placed on sterile sheets. All loose skin is removed and the surface cleansed with saline or some mild non-irritating antiseptic. It is very important to remove all loose skin in order to obtain a uniform tanning and also to remove all possible sources of future infection. It has been found that in cases in which there was incomplete preparation for the tannic acid, early evidence of infection under the tannate is manifested.

An aqueous solution of 2.5 to 5 per cent tannic acid is then applied to the surface by means of an ordinary atomizer every thirty minutes until a good tannate is formed, which usually requires 6 to 18 hours. The aqueous solution is used on and around the face, but it must be applied carefully, as there is some danger of injury to the cornea. The use of tannic acid jelly has been advocated on the face to minimize this danger.

The after-care of the tanned skin is very simple in minor burns, but the more severe cases must be watched carefully. In first, and some small second degree, burns the coagulum begins to come away in 8 to 12 days, leaving a dry layer of epithelium. In deeper burns, provided there has been no marked infection, the tannate must be removed, which is usually done by softening the edges with dicloramine gauze and wet dressings of saline. The sooner the coagulum is removed at this stage the earlier the grafting can be done.

After all the coagulum is off the raw surface is prepared for grafting by applying saline dressings. The most comfortable procedure is to place the patient in a tub of warm water two or three times daily for 20 to 30 minutes. This must be done gradually in the beginning in order not to overtax an already weakened individual. All burns of any depth should be grafted rather than allowed to heal by granulation. This is necessary not for cosmetic reasons alone, but to restore a functioning skin and to prevent future recurrence of injuries or malignancy in the scar.

During the entire treatment consideration must be given to the position of the patient in order to prevent contractions. No two raw surfaces must be allowed to come together. All joints must be held in an over corrected position and early motion and skin grafting will lessen the danger of this complication.

DISCUSSION

The tannic acid method of treatment in this clinic has not given the marked reduction in mortality which is reported in other clinics. However, the morbidity has been markedly reduced. The stay in the hospital is shortened in almost every instance. The complications are fewer, particularly the respiratory infections and general sepsis, and there is a lessening of scar formation due to protection of the epithelium and the small amount of infection.

Other advantages of tannic acid treatment during the first few hours are that it lessens the pain and prevents loss of the vital body fluids which escape from the wound surface. Epithelialization is hastened and is completed in shallow burns by the time the coagulum is removed. The burns are much cleaner by this method than those treated by wet dressings and some of the oily preparations. The necessity of frequent

and painful dressings is removed, which is an important economic factor.

As was first stated, tannic acid alone is not sufficient in caring for burns, but it is a great aid when used in combination with those measures which are utilized in combating the toxic substance developed following the injury. Until there is proper understanding of the cause of these changes, it is felt that the best results will be obtained from tannic acid treatment.

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DISCUSSION (*Abstract*)

Dr. B. O. Robertson, Birmingham, Ala.—If no other claim were made for this method of treatment than the relief afforded the patient, there would be ample justification for its use.

Opinion is divided as to the relative merits of the various methods of application of tannic acid. (1) A majority probably prefer an aqueous solution in 2.5 to 5 per cent strength. If burns are extensive and patients are numerous, it may be applied with an ordinary "flit spray" to save time. (2) Many prefer 5 per cent tannic acid in a jelly base. This method is especially applicable to smaller burns in ambulatory cases, as it can be readily applied under suitable dressings, and gives a satisfactory tanning. These preparations are readily obtained on the market. (3) There are others who prefer tannic acid in an ointment base. I have not found the ointments satisfactory.

The treatment of shock in these cases should be both prompt and efficient, and the early prognosis must of necessity be very guarded.

Some writers (Brancati, 1924) think the shock in burns is an anaphylaxis from the absorption of proteins that have been changed by the heat. Greenwald and Eliasberg, in 1926, demonstrated in rabbits that the cause of death in burns may be divided into two stages: (a) the initial stage due to shock, which is accompanied by high blood sugar content due to a hyperactivity of the suprarenals; and (2) the secondary stage, which is due to degenerative changes, particularly in the suprarenals. From this it would appear that the use of epinephrine should be restricted to the secondary stage. It is contraindicated in the primary stage. Theoretically, insulin might be of use in the primary stage.

Improper or insufficient preparation of the wound before tanning will often produce poor results. Meticulous care must be exercised in removing all dead or necrotic tissue. Application of magnesium sulphate compresses to the wound for 30 minutes to one hour will produce sufficient anesthesia to aid greatly in this preparation. The resultant fluid loss can easily be combated. However, many men hold that this fluid loss produces a beneficial detoxification.

One criticism of the tanning method of treatment in deep burns is the toxemia produced by the absorption of pus and necrotic material from underneath the coagulum in those cases that have infection. Unless this coagulum is incised early and adequate drainage secured, serious damage to the general condition of the patient may result. Another adverse factor is the fact that the odor, which is present in some degree in all large burns, may sometimes be even more pronounced with this method of treatment and cause much annoyance to the patient and to others.

Proof of the fact that the reasons for using tannic acid far outnumber the reasons against it, is evidenced by its growing popularity.

Dr. J. Shelton Horsley, Richmond, Va.—Undoubtedly the tannic acid treatment has been a distinct improvement in the therapy of burns. There is one point, however, that I think should be emphasized. In extensive burns the mortality is extremely high. Dr. F. P. Underhill, in the *Journal of the American Medical Association* for September 20, 1930 (95:852-857) has given the result of his studies on extensive burns. He was particularly interested in the subject on account of a very severe fire in a theater in New Haven. Dr. Underhill has shown conclusively that the chief factor in the treatment of extensive burns is the control of the concentration of the blood. No matter how carefully the local treatment is carried out, this concentration of blood will cause death in many cases of extensive burns unless it is counteracted. The best method of treating this concentration is by intravenous injection of 5 per cent dextrose in Ringer's solution.

In a recent patient treated by Dr. John S. Horsley, Jr., and me, there was not only an extensive burn over the chest, abdomen and extremities, but there was also injury to the skull, which produced some concussion of the brain. The extent of the brain injury was not known, and we feared to give intravenous fluids too early. After applying the tannic acid treatment, the patient became somewhat conscious and about fifteen hours after the injury the blood pressure began to fall rapidly. There were other alarming symptoms, such as muttering, delirium, and a rapid pulse. A vein was opened and about 500 c. c. of 5 per cent dextrose in Ringer's solution were run in within a few minutes. This brought his systolic pressure to about 110. The intravenous solution was kept up continuously for about two days. From 100 to 200 c. c. an hour were given. The blood pressure was maintained at a good level and the patient made a somewhat slow but satisfactory recovery.

Of course, fluids should be administered by mouth, and probably also by proctoclysis, but the urgency of the situation which requires the quick introduction of a large amount of fluids in these desperate cases is best met by the intravenous administration of dextrose in Ringer's solution.

CARCINOMA OF THE BULBAR CONJUNCTIVA*

By K. W. Cosgrove, M.B., M.D., F.A.C.S., Little Rock, Ark.

Carcinoma may and does develop in the conjunctiva as a primary malignant tumor. The origin is usually at the limbus, which is richly vascular. From this point, it may spread either to the cornea or the bulbar conjunctiva. It is and should be spoken of as an epibulbar tumor. This new growth presents several peculiarities:

(1) Metastases to the regional lymph nodes are rarely seen.

(2) The general health of the patient is not disturbed.

(3) The growth is slow. One case to be reported had a history of seven years' duration.

(4) The growth spreads over the surface, but rarely penetrates into the eyeball.

(5) There is an unusual tendency to recession.

The growth appears first as a small nodule resembling a phlyctenule (according to Graefe) and is easily mistaken for this. The growth spreads across the cornea, usually in a grossly uneven manner, although smooth growths have been noted (Saemisch). The color is not typical. Grayish-white is probably the most commonly reported color; however, both reddish and pure white tumors have been reported. The consistency varies. Some are soft and fragile, while others are hard and solid. Occasionally the tumor is pedunculated. (Cases of this type have been reported by LaGrange and DeWecker.) The growth, without exception, is single. The tumor usually does not penetrate Bowman's membrane. Occasional cases of penetration to the anterior chamber have been reported by Goldzieher, Graefe, DeSchweinitz, LaGrange and others. It has been mentioned by them that the tumor could travel along the lymphatics of the anterior ciliary vessels to the interior of the eye. These cases must certainly be rare, as very few have been reported.

Etiologically, there are probably three predisposing relations which hasten the development of these tumors: first, at the limbus, a transitional change takes place where the conjunctival layers go into the cornea; second, papilliform outgrowths have been observed normally in this region (Nakajawa); and finally, trauma must be considered as a predisposing cause. Several cases have been reported by Saemisch following various injuries. In the second case reported in this paper, the only relation between the trachoma and the carcinoma that could reasonably be presumed is that the repeated trauma of rough and scarred lids would predispose to a new growth.

In respect to age, this group of malignancies follows the general rule. The great majority are seen after forty years of age. Up to the present, only ten unquestioned cases have been reported under this age.

Pathologically, this tumor may be classed in the squamous group. It presents epithelial strands with a connective tissue stroma filled with engorged blood vessels. The epithelial strands grow into the stroma at variable depth and direction. Many of the so-called epithelial pearls may be encountered. Many observers found pigment in the stroma either sparsely sprinkled or densely packed in small local areas; however, this cannot be considered a typical finding in these tumors. The interesting pathological finding is the rarity of metastases. Several cases have been reported of from two to five years' duration without lymphatic involvement. One of the author's cases had been present for seven years with no metastases.

In making a diagnosis, these tumors must be differentiated from the following conditions:

(1) A phlyctenule. This is usually multiple and shows inflammatory changes. Carcinoma of the limbus is always single.

(2) Sarcoma of the limbus is a more rapidly growing tumor, is ulcerative, and bleeds easily and frequently.

(3) History and appearance will easily differentiate a dermoid.

(4) Papilloma, with its wart-like appearance, should not be misleading.

(5) Parinaud's peculiar growth, which he calls a dermo-epithelioma and which is undoubtedly a nevus, is a yellow transparent growth usually found in younger individuals.

In the treatment of these cases, the following rules appear to be the safest:

(1) In early tumors, complete removal followed by superficial x-ray therapy will usually restore normal vision. Metastases or recurrence will rarely be seen from early cases treated in this manner.

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(2) In tumors completely covering the cornea, removal of the eye followed by x-ray therapy to the socket and preauricular lymph node is necessary to prevent recurrence.

(3) Those tumors extending beyond the bulbar conjunctiva, or in cases where recurrence has followed previous treatment, complete exenteration of the orbit followed by x-ray therapy is the only rational course. This, in my estimation, would seldom be necessary with this type of tumor.

The following is a report of two cases seen by the author.

J. W. W., a white man, aged 62, complained of a growth on the left eyeball.

The family and past history was negative.

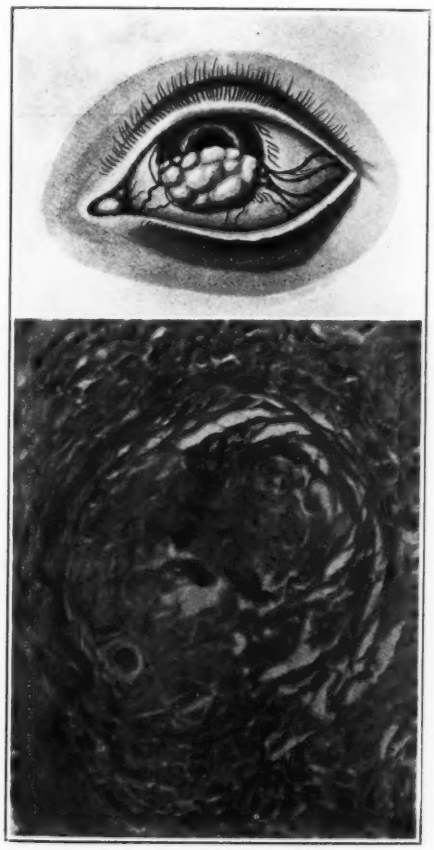

Fig. 1, Case J. W. W.
Top—Drawing of eye.
Bottom—High power section.

Seven months previously, the patient noticed a small growth on the lower part of the left eye. This gradually spread over the cornea until it interfered with vision.

A small white nodular tumor mass covered the lower half of the cornea. The tumor was soft, but not friable. No ulcerations were present. There was no enlargement of the preauricular or cervical lymph nodes. The remainder of the examination was essentially negative.

The tumor was removed with a Graefe knife and the base cauterized with the actual cautery. Following this, in one week, he was given the following x-ray therapy:

Twelve hundred roentgen units were given over the cornea in one treatment. Peak kilovolts, 85; anode, skin distance 12 inches; milliamperes, 5; time, 10 minutes; filter, none. After one year, the vision was 20/30, and there had been no recurrence.

This patient died eighteen months following operation with carcinoma of the stomach.

The pathological report by Dr. Harvey S. Thatcher, Department of Pathology, University of Arkansas School of Medicine, follows:

Macroscopic.—The tumor is 5 x 1 mm., irregular, greyish white and soft.

Microscopic.—Closely compressed squamous cells make up the section. These cells are more closely packed together near one edge where they have a tendency to be in the same plane. Here vascularity is prominent. At this edge, there is a small region of cells undergoing necrosis and containing a few polymorphonuclear leucocytes. There are whorls of cells which resemble beginning pearl formation with a tendency for hyalinization. Most of the cells contain considerable chromatin, but a few have only a slight amount. There is much intercellular substance in about one-half of the section.

The diagnosis is squamous cell carcinoma.

Case 128921.—A white man, age 68, complained of a tumor of the right eye.

His father had had carcinoma of the right side of the nose.

Sixteen years previously, the patient was treated for trachoma. This treatment continued over a period of years.

Seven years previously, following an indefinite trauma, a small growth was noticed on the upper part of the right cornea. This became steadily larger, covering the eyeball in about three years. He has been unable to close the lids over the tumor for the past nine months.

His head was negative upon physical examination with the exception of the eyes. The right eye showed a large mass protruding from the entire cornea about 1 cm. above the normal contour. There was a small ulcerative area on the temporal side. The lids did not close over the mass. The left eye showed scarring of both lids. There was evidence of an old pannus with vascularization of the upper part of the cornea. There was no enlargement of the preauricular or cervical lymph nodes. The remainder of the physical examination was essentially negative. The urine was negative. There were 4,500,000 red cells, 70 per cent hemoglobin, and 8,300 white cells.

On the day of admission, a small section of the growth was taken for pathological examination. The diagnosis of squamous cell carcinoma was made. On

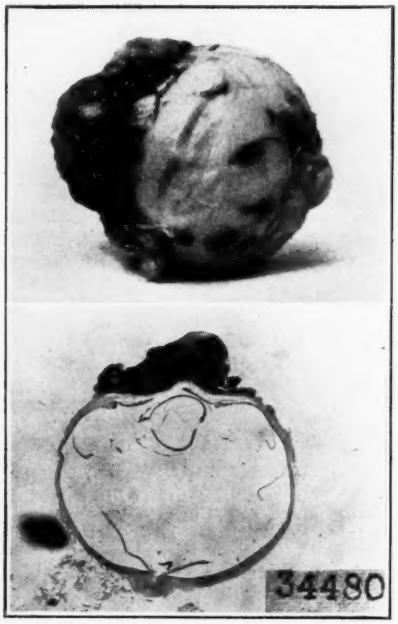

Fig. 2, Case 128921

Top—Gross specimen.

Bottom—Cross section of eye. From American Registry of Pathology, Army Medical Museum, Washington, District of Columbia.

the following day, the entire globe of the right eye was enucleated. The patient made an uneventful recovery. Starting the sixth day, he was given 1,305 roentgen units of x-ray therapy in the following manner:

Voltage, 175 peak kilovolts; anode skin distance, 50 cm.; milliamperes, 5; filters, 0.25 mm. copper and 1 mm. aluminum; time, 3 hours. The treatments were given on six successive days. Each treatment was 30 minutes in length. Six were given to the eye socket, and three were given to the preauricular and cervical gland areas.

There has been no recurrence of the growth twenty months after the date of operation.

The pathological report by Major George R. Callender, of the Ophthalmic Division, American Registry of Pathology, Army Medical Museum, Washington, D. C., follows:

Macroscopic.—An irregular mass of dark colored dense tissue extends over practically the entire cornea and over most of its extent. It extends 2 or 3 mm. beyond the limbus. The maximum thickness is 8 mm., the minimum 2 mm. On section, no definite abnormality is noted within the globe.

Microscopic.—A dense tumor mass extends from 3 mm. outside the limbus on both sides of the section, over the cornea, being somewhat irregular in thickness. It has invaded the superficial tissues of the sclera. This mass consists of a lymphoid stroma invaded by masses and infiltrated by cells of a carcinoma arising from the conjunctival or corneal epithelium. The reaction responsible for the production of the lymphoid stroma has destroyed Bowman's membrane and the anterior layers of the cornea. In certain areas, this lymphoid structure is in the nodule formation of trachoma, but, for the most part, the carcinoma has replaced it, leaving islands and irregular areas between the tumor masses. On one side of the growth there is a considerab'e thickness of typical squamous cells showing intercellular bridges, but the greater part of the tumor consists of

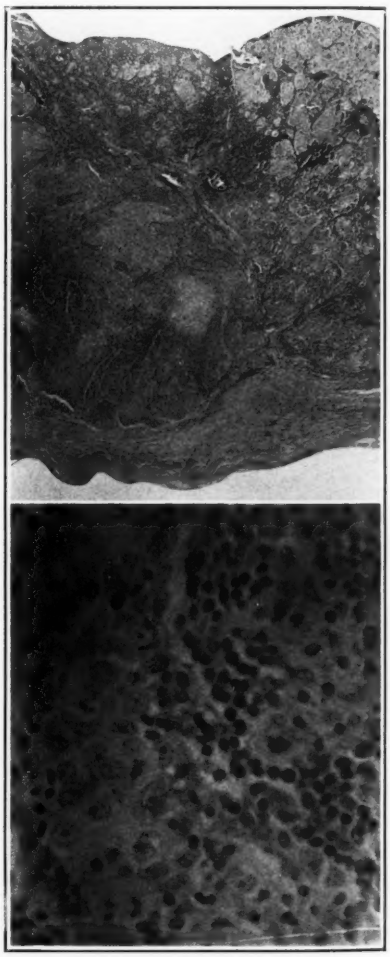

Fig. 3, Case 128921

Top—Low power. From American Registry of Pathology, Army Medical Museum, Washington, D. C.

Bottom—High power.

somewhat smaller polygonal shaped epithelial cells grouped in masses or finger-like projections with relatively sharp demarcation. There are numerous ill-defined areas and separate small groups of infiltrating cells apparently unconnected with the larger tumor masses.

This type of tumor could arise from corneal epithelium or the conjunctiva, and, at this stage, it would be impossible to state the point of origin. The trachomatous inflammatory reaction appears to have invaded the cornea and then, in turn, has been invaded by the tumor. The trachomatous condition appears to have been still active at the time of enucleation of the eye.

The interior of the eye shows a little edema of the iris and some thickening of the walls of the retinal arteries, but, otherwise, it is essentially normal.

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DISCUSSION (*Abstract*)

Dr. E. W. Griffey, Houston, Tex.—Epibulbar carcinoma is a comparatively rare tumor, though it occurs more frequently than epibulbar sarcoma, the other malignant tumor which attacks the surface of the eyeball.

The commonest point of origin is at the limbus, where a down-growth of the cell processes occurs, though it may originate at any spot on the ocular conjunctiva. Because of the transitional types of epithelial cell found at the corneoscleral junction, growths arising there are regarded as more malignant than those arising from other areas in the conjunctiva. Bowman's membrane and the sclera offer great resistance to the cells, so they tend to grow laterally rather than to invade the globe. Invasion of the eyeball occurs not infrequently. De Schweinitz found perforation in 37.6 per cent of the eyes he examined, but as this represented a great many enucleated eyes in which the lesion was far advanced, this figure is doubtless higher than the average. Invasion of the globe is more likely to occur in growths beginning at the limbus by following the lymph sheaths of the perforating anterior ciliary arteries. Another route is by extension along the lymphatics to Schlemm's canal and through the spaces of Fontana to the angle of the anterior chamber.

In neglected cases the growth, following the line of least resistance, often perforates Tenon's capsule and invades the orbit. Prickle cell cancers, such as these, are more malignant than the rodent ulcer (basal cell type) and once the growth enters the orbit it is likely to invade muscle, bone and all other orbital tissues. There is always a severe inflammatory reaction when carcinoma invades the orbit, with much fibrous tissue and early fixation of the globe.

The diagnosis of epithelioma of the conjunctiva is not always easy or indeed possible except by biopsy. Dr. Cosgrove, in the description of the growth in his second patient, stated that it was pigmented. Pigment is supposed to be characteristic of sarcoma, but this is not always true. The histogenesis of the chromatophore, the cell typical of melanoma, is unknown and equally good authorities are divided as to whether it is of mesoblastic or epiblastic origin. Nevo-carcinomata have been described and are regarded as more highly malignant than the unpigmented type.

Epithelioma of the conjunctiva usually progresses by direct extension, but occasionally it metastasizes to the preauricular and submaxillary lymph nodes. Calhoun reported the extirpation of a carcinomatous preauricular gland that had metastasized from a conjunctival growth, with no recurrence after six years.

I am in complete agreement with Dr. Cosgrove concerning the treatment of these growths. The small early growths may be safely removed by several applications of radium. The larger ones should certainly be excised and later treated by radium or the x-ray. For obvious reasons, all these patients should be kept under observation for a longer period of time than those suffering from any other chronic condition with the possible exception of glaucoma. Several cases of cataract recently have been reported, several years after the use about the eyes of x-ray and radium, and this must be kept in mind in directing the treatment. Several cures have been reported by the application of radium alone. Some cures have been reported by the application of the thermophore at 140 degrees F. for one minute and reapplied as often as necessary. While I have never used this modality for epithelioma, it appeals to me as a safe method and, in selected cases, one that is worthy of adding to our list.

Dr. K. W. Constantine, Birmingham, Ala.—We are grateful to Dr. Cosgrove for reminding us that there are such tumors as primary epitheliomata of the conjunctiva. As in all malignant tumors, their early recognition is of the utmost importance and, in doubtful cases, it may be necessary for the pathologist to establish the diagnosis, preferably by frozen sections.

Such benign tumors as adenomata, fibromata, papillomata and the like occurring about the limbus should be thoroughly excised and radium applied to the base on account of their tendency to recur and the danger of malignancy.

Almost every conceivable malignant tumor has been found to occur in or about the limbus and in the bulbar conjunctiva. The more frequent are some form of sarcomata.

Since reading Dr. Cosgrove's paper a short time ago, I have seen two tumors of the conjunctiva, one a pyogenic granuloma in a colored boy four years of age. This dense mass arises from the inner canthus, spreads above and below the cornea in a semicircular manner and folds on itself, the edge of the fold extending to the cornea. There is no history of trauma or dacryo-

cystitis and no inflammation of the conjunctiva. Dr. Graham's microscopic diagnosis is pyogenic granuloma or compact mass of granulation tissue. The mitotic figures, he says, can be explained by the active growth of the inflammatory tissue.

The other case is that of an epithelioma near the external canthus that has spread into the conjunctiva in the manner of a rodent ulcer.

Dr. F. H. Rosebrough, San Antonio, Tex.—I show you here Prof. Salzmann's well known chart representing the normal position of the cornea, the limbus and a part of the sclera and call your attention to the fact that the epithelium of the cornea passes directly over upon the conjunctiva. In other words, it continues as the conjunctival epithelium upon that membrane. There are some changes that occur. It is thicker at the limbus than upon the cornea, has the same characteristics, but quickly the characteristic basal cells of the conjunctiva make their appearance. The nuclei of these cells form a thick dark row which lies close to the border, whereas the nuclei of the basal cells of the epithelium of the cornea and limbus appear more separated and paler and at a perceptible distance from the epithelial border.

When perforation occurs it takes place at the same portion of the eye where an intra-ocular tumor breaks through; that is, by way of the anterior ciliary vessels and probably by passage of the invading cells along the perivascular lymph spaces.

Dr. Ray K. Daily, Houston, Tex.—In reporting cures of carcinoma of the conjunctiva, one has to allow a sufficient length of time to elapse before being sure that there will be no metastasis. Seven years ago I had a patient with an epithelioma which healed almost as if by magic after one application of a 5 mg. monel metal needle for two hours. The patient died four years later from a malignancy of the parotid.

Another patient several years ago developed a carcinoma of the lid, which was excised. He returned a year later with an extensive involvement of the lid and ulceration of the eyeball. The orbit was exenterated and, as in Dr. Cosgrove's case, the microscopic examination showed a squamous cell carcinoma and a trachomatous pannus. Only recently I saw a large cauliflower growth on an eyeball with vision still normal. One hesitates to sacrifice such an eyeball and yet that is the only logical procedure.

Dr. Wm. Thornwall Davis, Washington, D. C.—May I mention in connection with Dr. Cosgrove's interesting and instructive paper the condition melanosis conjunctivae? This may be benign, but occasionally develops into the highly melanotic sarcoma. The appearance of the eye is often bad and patients seek the removal of the pigmented area.

One hesitates to remove the growth surgically for fear of stimulating what might otherwise be a quiescent disease. X-ray and radium are not without danger. The thermophore of Shahan has accomplished the disappearance of the growth in a satisfactory manner in several cases.

Dr. Cosgrove (closing).—I do not consider carcinoma of the limbus a menace to life if it is handled as outlined.

OPERATIVE AND NON-OPERATIVE GLAUCOMA*

By J. W. JERVEY, M.D.,
Greenville, S. C.

There are more ways than one of skinning a cat. Similarly, there are more ways than one in which to treat glaucoma. What I am about to say to you is more or less elementary, but I feel there are those amongst us who might benefit by a little stimulus of thought. I shall be brief, touching only the high points of physiology, pathology, therapy and surgery.

Just by way of argument let us divide our glaucoma cases into two classes: those with deep and those with shallow anterior chambers, referring only to simple chronic glaucomas. It does not matter whether you say you see more of one than the other. In question of fact it is quite possible, and I speak from the words of my old friend, beloved by us all, Henry Dickson Bruns, of New Orleans, that a large number of the negro victims have deep anterior chambers. The immediate question is what to do with them, white or black.

Personally, I am quite convinced that as long as you can keep a glaucoma patient comfortable, that is, without pain; with a conservation of visual acuity; a reasonably unrestricted field of vision, and a tension not seriously overstepping the bounds of normal, you are doing well with him or her, as the case may be. This much I think you will all agree with; and if you do not I shall be greatly interested in hearing why! I feel I am speaking to educated ophthalmologists and do not have to explain each theorem in detail.

The great question is how you are to keep these patients in this altogether desirable condition. How are you to determine whether it is an operable or a non-operable case? The answer is rather simple. As long as you can keep a patient without pain, loss of acuity of vision, loss of field or excessive tension you should not operate. These, then, are the four outstanding considerations (one or more of them) for operative interference: pain, vision, field, tension. The details of each, it is not necessary in this distinguished company to enter upon.

Of course, I am quite familiar with the dictum of Henry Elliott and other equally distinguished,

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or more so, authorities on glaucoma. His, and their, idea is that once the diagnosis is made operation is desirable. I dare to question this. It often happens that old people with glaucoma live out their lives with useful vision. Twenty two-hundredths is not so bad if you are threatened with blindness, and this with a fairly good field is infinitely better than twenty-fifteenths with a gun-barrel field. Try it for yourselves with plus spheres. And the history of many a glaucomatous case is that they reach this point and lose no more vision. What would you do if you had it? Twenty two-hundredths or an operation that at least is doubtful of results?

Therapy is a debatable point even among the most experienced of us. But happily or unhappily, intelligent therapy demands a complete understanding of physiology, pathology and, *ex necessitate*, etiology. Who has it? We are lost in a maze of theories and, as yet, incomplete experiments. Most of us believe that the canal of Schlemm provides intra-ocular drainage. But several careful and capable investigators, like my friend Eugene Lewis, of Los Angeles, believe that the principal drainage of intra-ocular fluids is through the cornea in the neighborhood of the limbus.

However, this does not lessen the importance of the apparently established fact that miotics are of great value in reducing the tension of the glaucomatous eye. The two theories are not incompatible. The miotic tends to draw the tentatively adherent iris away from corneal adherence in the iris angle and so opens up the avenue of excretion, whether it be through the canal of Schlemm or through the corneal limbus.

According to Lewis's ideas, seemingly gathered from many sources, as well as his own experiments, the corneal stroma is easily permeable, and the chief inhibitory strata are the endo- (Descemet's membrane) and epithelium. Even if we choose to accept this theory, it is still possible to show the rationale of many of the operations designed for the reduction of tension in the glaucomatous eye. For each, if not all, of the operations provides a break in one or both of the inner and outer limiting membranes of the cornea, and so provides an adjuvant to hitherto limited drainage.

Regardless of physiology and pathology, and speaking only as a practical oculist (I prefer the term to the rather pedantic "ophthalmologist"), it is my firm belief that, disregarding deep or shallow anterior chamber, and disregarding objective changes like what we may choose to call, rightly or wrongly (I mean as we observe it), a cupped disc, if we can control the cardinal demands of "prevention of pain and tension, preservation of vision and field" we have no excuse for operating.

As to how, therapeutically, these four cardinal demands may be met is not within the purview of this paper. Whether it can be done by local or systemic therapy, by miotics or the balancing of "body chemistry" must be left for another discussion. Suffice it to say, speaking to this fully informed, and I hope appreciative, gathering, that if, as, and when these four cardinal necessities can be met and controlled—to repeat—considering pain, vision, field and tension, then operation on the glaucomatous eye is not indicated.

If either one or more of these physiological and pathological indicators cannot be kept within its field of reasonable variation, then operation becomes imperative. The reasons are fundamental, even elementary. Pain and loss of vision because their relief is mandatory; the restricted field, because even with keen central perception a gun-barrel view of the world is a sad and difficult one; continued high tension because it inevitably leads to optic atrophy and blindness.

OPERATIVE ELECTION

In such a case, then, we may consider the choice of operation. It can be stated briefly. The most popularly done operations of today, namely, the Elliott trephine and the LaGrange operation, involve permanent destruction or discontinuity of the tunics of the bulb. If the same results can be achieved without such permanent weakening, it is my belief and argument that such a course should be pursued. This can be accomplished in all cases of glaucoma, acute or chronic, with shallow anterior chamber, by my operation of sclero-post-iridectomy, which I have described to you on several different occasions. It involves no permanent weakening of the tissues of the eyeball and provides adequate drainage, in the light of clinical experience.

When the anterior chamber is deep and the question is one not of pathological insufficient drainage, but of a physiological incapacity to drain, possibly combined with a pathologically increased intra-ocular secretion, then the only relief necessarily lies in the establishment of additional drainage channels through the medium of a filtrating cicatrix, of whatever form you choose, whether an Elliott trephine, a LaGrange, an iridotasis or what not.

In the meantime, may I not urge you to study, in connection with these cases, your physiology, your pathology, and above all (and, believe me or not, this may prove to be the answer) your biochemistry?

DISCUSSION (*Abstract*)

Dr. John H. Burleson, San Antonio, Tex.—The complexities and inconsistencies of intra-ocular pressure leave us in a mental fog from which it is often difficult to emerge.

A discussion of a single phase of glaucoma, whether it be etiology or treatment, either medical or surgical, is likely to drift far afield. I know of no situation in medicine and certainly none in ophthalmology that requires more moral courage and cool nerve than to advise a patient who has fair vision to have an operation for incipient glaucoma. We are often criticised if we do and always criticised if we do not.

Many patients fail to remain cured for their normal expectancy, either with or without operation. Every potential glaucoma suspect should have a careful physical examination. Some wise-cracker has observed that a routine diagnosis of focal infection is the refuge of the clinically destitute. Nevertheless, teeth, sinuses, tonsils and all points of infection should be checked before any prolonged treatment is begun.

I have long been of the opinion that the number of glaucoma cases found in a physician's private practice is a good index of his ability.

The definite knowledge that eyes which develop glaucoma have had changes in their nutrition and metabolism for some time prior to diagnosis makes it apparent that changes may be confined either to the posterior or anterior chamber. In posterior involvement we have a swollen vitreous, hence a shallow anterior chamber. In anterior involvement we see a deep anterior chamber. In either event, our damage comes from pressure for lack of drainage.

From my viewpoint, I must disagree with the essayist. Continued use of miotics alone is watchful waiting, no matter how successful they may be. My experience has been that the patient loses visual field slowly, but surely, all the time. Many of these patients never have pain and consult the physician for loss of vision after much damage has been done.

The only constant early symptom is increased tension. Other manifestations come later. When I have definitely determined that tension is a constant symptom, I advise operation followed by miotics as required. This advice is given because we know that miotics alone reduce tension. We also know that operation reduces tension. Why not give the patient double protection? We know that many patients will need it and we are unable to say which one.

My difficulty has been not whether to operate, but what operation to do. I am greatly interested in any new operation for the relief of tension. Years ago I journeyed to Boston to hear Elliot and to see him do his trephine. I was much impressed with the man and his operation. There is no question that the immediate results of the trephine are brilliant, but the postoperative complications and end-results make it a doubtful procedure. I have abandoned the operation.

A LaGrange is safer; my choice, especially in a seeing eye, is a broad basal iridectomy.

The operation that does the least violence to an already diseased uveal tract is the operation of election. Our essayist, Dr. Jervey, several years ago read a paper before this Section and described the technic of an operation which he was doing. I have done his operation in eight cases. My results up to date have been 100 per cent successful in the reduction of tension, though in two cases I have continued with miotics. I wish to commend this operation for your consideration.

The final test of any procedure is whether or not the patient remains well. My first case is now ten months old and the tension is still down. I believe a vitreous decompression at the time of operation would improve the end-result.

Had this operation been devised by Ignarz Mitrovitch, of Vienna, it would have had far more disciples than it has.

Dr. K. W. Constantine, Birmingham, Ala.—Three years ago, while in Copenhagen, I was converted to the operative rather than therapeutic treatment for glaucoma. Prof. K. K. K. Lundsgaard demonstrated an iridencleisis operation that he had adopted for all forms of glaucoma. This operation had given him such satisfactory results and he was so enthusiastic about it that I decided to give it a trial.

Since that time I have performed this operation on 32 eyes, and except for two eyes it has been uniformly successful. One of these was a buphthalmos and the other a microphthalmos. The former case is a fair success. The cornea is fairly clear and the child is able to get about by herself; in fact, she sees better than at the time of operation. The latter case had a previous trephine above and this necessitated operating below the cornea. Although the tension is still too high in this eye, it at least was not damaged by the operation. Eleven of these eyes were acutely inflammatory with extremely high tension, the kind of cases in which a trephine operation would be contraindicated, and an iridectomy even with sclerectomy does not give uniformly good results. In only one case has there been the slightest pain after operation.

The technic is as follows: after the usual cleansing and instillation of 4 per cent cocaine, the lids are injected with novocaine, a retrobulbar injection of about 1.5 c. c. of 2 per cent novocaine going in above the internal lateral ligament is given and about 0.5 c. c. of novocaine subconjunctivally above the cornea. The conjunctiva is incised straight across about 12 mm. above the limbus and the flap is dissected down to the edge of the cornea. It is not necessary to split the cornea. With the special knife the sclera is gradually incised by gentle but firm strokes at the edge of the limbus, and when the knife goes through the opening is about 3 or 4 mm. long. If the iris does not present in the wound it can very easily be grasped with the iris forceps and pulled well into the wound, and with the Dewecker scissors a straight iridotomy is performed to include the sphincter of the pupil. One edge of the iris is pulled in one angle of the scleral

wound and the other edge in the opposite angle. The conjunctival flap is replaced and the edges are whipped with a running suture of silk without tying. On account of the direct incision through the sclera the iris will not slip back into the anterior chamber. After the operation a liberal amount of oxycyanide of mercury 1:4000 with ¼ hyoscine ointment is placed in the eye, and in only a few cases has any further medication been used. The stitch can be removed in three or four days and the patient may go home.

After this operation the tension rarely drops more than 10 points below normal or rises 10 above. If it rises, it can be reduced by massage and in a few cases it seems best to employ 1 per cent pilocarpine.

The corneal or scleral knife is the only new instrument needed. This is a safe and easy operation to perform and I recommend it for increased intra-ocular tension of any type.

Dr. William D. Gill, San Antonio, Tex.—Massage of the globe is one of the most important adjuncts to the postoperative treatment of glaucoma regardless of the type of operation performed. It should be performed gently at first and later the duration as well as intensity may be increased. Neglect of this phase of the postoperative treatment is one of the frequent causes of failure.

Dr. W. G. Harrison, Birmingham, Ala.—Glaucoma remains the bete noir of eye diseases. Of few other maladies are we so ignorant. Is it caused by excessive secretion or defective excretion? If drainage is at fault, is it in Schlemm's canal, in the corneal endothelium or in the corneal epithelium?

Is it from a chemical change in the aqueous or the vitreous? Is it a disease of blood vessels, lymphatics, or a disturbance of metabolism? We do not know.

We have pulled hard and strained heavily, but traveled a short way since the time of von Graeffe. Fuchs says glaucoma is never cured and he reminds us that though treatment may afford precious relief for a time, the day of disaster is certain if the patients survive many years. In view of this *ex cathedra* statement by the doyen of our specialty, what seems the safest attitude? The first advice of Hippocrates was "Do no harm."

Three drugs, and only three, are accepted by men of all nations as dependable in delaying the progress of glaucoma in a large percentage of cases. Their use involves no risk if we can keep close check on the cases.

Sixty different surgical operations with no one and no four or five accepted by all operators are positive proof that the ideal one has not been devised.

Recently some of the best surgeons of the Pacific Coast urge the advantages of the smallest possible trephine opening. Another distinguished authority from the Chesapeake regards most failures as due to the small size of the trephine employed.

Some writers advise that success can come only from a permanent filtration scar. Another of equal success acclaims that we must effect drainage without weakening the coats of the eyeball.

One writer explains his own success by his skill in removing every shred of iris tissue from the operative wound. Some recent authors agree that the *conditio sine qua non* of a successful issue lies in the presence of small iris shreds which become incarcerated in the filtration wound.

The contradictions and confusions suggest the anecdote of a stupid student who heard von Graeffe talk daily for weeks on the subject. As he went to say good-bye to the old man, he asked: "Professor von Graeffe, what is the best treatment for glaucoma?", to which the old man replied: "Refer the case to your most promising rival."

When success smiles we proudly acclaim the advantage of the method employed; when failure frowns, we subconsciously wish we had chosen a different operation.

What is the choice operation in any particular case? The one you can perform with most skill. The answer to this question has been forcibly suggested by a remark of Dr. Riach, of San Diego: "The secret of success lies in the finesse of technic rather than in the choice of operation."

I have no experience with the operation mentioned by Dr. Jervey, but doubt not, in his hands, it answers every purpose and compares most favorably with other methods in the hands of their respective favorites.

Dr. S. Weizenblatt, Asheville, N. C.—Some cases of glaucoma show over a long period increased tension (to 60 mercury Schiotz) without damage to the visual acuity or field of vision. Elschnig called attention to these rare, interesting cases. The anatomical structure of the lamina cribosa is in these cases the factor which prevents the optic nerve from being affected by the high intra-ocular tension.

Dr. Harvey B. Searcy, Tuscaloosa, Ala.—A glaucomatous eye will sometimes withstand an enormous amount of mutilation. Even the smallest amount of vision to a patient is very valuable.

In 1931 I saw a woman of 70 who had simple glaucoma in both eyes. After two trephining operations upon one eye and one upon the other, a cataract developed in both eyes. In March, 1932, I did a preliminary iridectomy on the right eye (she still has some vision in the left eye) peripherally to the trephine scar. One month later the lens was removed. In August, the tension being now 50, Dr. K. W. Constantine and I did a cyclodialysis, going in just to the temporal side of the iridectomy. September 10 I did a LaGrange to the nasal side of the upper trephine scar. September 30 I did an improvised combined trephine and iris inclusion operation in the lower nasal quadrant. In this operation I made the usual trephine opening, introduced one blade of the scissors and made a cut down from the trephine hole and brought up the iris, wedging it into this cut after removing a small portion. Since that time there has been no elevation in tension, no redness, and she has had a vision with glasses of 20/100 with scotomata.

Dr. Jervey (*closing*).—Probably we could come pretty nearly unanimously agreeing that operative technic is of more importance than operative method.

SPINAL CORD INJURIES*

By R. E. SEMMES, M.D.,
Memphis, Tenn.

In the management of spinal cord injuries two problems present themselves: first, that of preventing or limiting damage, if possible; second, that of handling the resulting physiological disturbances so as to prevent death from respiratory paralysis, abdominal distention, hyperpyrexia, urinary infection or bedsores before recovery can take place.

The seriousness of injuries to the cord makes it urgent to do anything that promises any hope of success. The rapidity with which the cord is known to soften when subjected to sudden pressure or circulatory deficiency demands that measures to relieve these factors be carried out without delay.

In these days of rapid transportation, patients with cord injuries are usually admitted to the hospital within a few hours of the accident at most. Questions to be answered are: (1) the extent of the interruption of the cord function? (2) the level? (3) whether severance or a destructive lesion exists? (4) whether pressure is still being exerted upon the cord? Answers to all of these can and should be ascertained within an hour after admission.

The manner and degree of injury, whether paralysis and anesthesia appeared instantly or gradually, throw light upon the probable nature and extent of the cord damage. Determining the completeness and level of sensory and motor loss (physiological block) is a matter of but a few minutes. In fracture-dislocations of the spine, abnormal separation and displacement of the spinous processes can usually be seen and felt. Roengenological studies directed at the proper level show the condition and position of the vertebrae, presence of impingement upon the canal, angulation and rotation, indicating whether the amount of offset or impingement is so great that severance or a destructive lesion must have taken place. While the x-ray films are being developed, lumbar puncture will show whether the fluid is bloody and a Queckenstedt test will demonstrate the existence of a complete or partial blocking of the subarachnoid space (fluid block) if present.

Thus, the presence of an injury to the cord is shown by neurological examination. The condition of the spinal column, route of location of a bullet, the presence of a knife or ice pick fragment and the probability of a hopeless lesion is estimated by x-ray examination. The presence or absence of pressure is determined by the use of the manometer. The value of the Queckenstedt test in cord injuries was first emphasized by Coleman and is usually the deciding factor in determining whether or not a laminectomy is indicated.

Possible Errors.—The cord may not be destroyed, even if a considerable degree of offset is present, due to the fact that the neural arch of the forward displaced vertebra may be fractured, preventing the "scissors" effect. It will be remembered, of course, that below the first lumbar vertebra the cauda equina is a bundle of nerve filaments which can adjust itself to almost any change of shape of the canal or degree of angulation. Though no fluid block be present, a bone fragment or foreign body may be pressing against the center on one side of the cord, allowing fluid to pass freely. Both of these exceptions may cause a refusal to operate upon cases which might be benefited.

Little offset or impingement upon the canal may be shown in the x-rays, and this may lead to exploration when the cord is found completely severed. The marked displacement at the moment of injury may destroy the cord, then the vertebra slips back into place immediately or at least before x-ray examination. Thus a useless operation is performed. This has happened four times in my experience. However, no harm was done and the knowledge of the hopelessness of the lesion was worth something.

With the recognition of the fact that a physiological block of the cord due to simple concussion, contusion, edema or pressure cannot be distinguished neurologically from anatomical severance, the completeness or incompleteness of the lesion had to be abandoned as a guide to surgical interference. Using this as a determining factor, some surgeons operated only upon those with a complete lesion and others only upon those that were incomplete. The suggestion of Mixter and others that indication for laminectomy be based largely upon whether the signs and symptoms were improving, stationary or growing worse, requires delay for observation, but we know that even a few hours of strong compression or ischemia may destroy the cord. This has been demonstrated experimentally by Allen and observed

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at operation and postmortem examination in man.

We have proposed a working classification for treatment as follows:

GROUP 1. CASES IN WHICH LAMINECTOMY IS INDICATED

(a) Incomplete injuries with "fluid block."

(b) Complete transverse injury with "fluid block."

(c) Cauda equina injuries with or without "fluid block."

(d) Cases of old injury with incomplete physiological and complete "fluid block."

GROUP 2. CASES REQUIRING ORTHOPEDIC MEASURES ONLY

(a) Compression fractures of spine without cord symptoms (potential cord injuries).

(b) Incomplete injuries with no "fluid block."

(c) Complete transverse injury with no "fluid block."

(d) Cases with roentgenological evidence of severance of the cord.

Following this plan, I have operated upon 69 of the 121 patients whom I have treated for cord injury during the past six years.

In all, compression of the cord by bone fragments, a neural arch resting upon it, posterior edge of the back of displaced vertebra pressing against it, or sharp angulation or dural binding against the swollen and angulated cord was found, amply justifying the effort to give the cord its best chance to recover. Usually one or more of these conditions was present at once. The cord was in need of surgical relief even if sometimes it was beyond physiological recovery. The only exceptions are the 4 cases mentioned above in which I was misled into exploring cases in which the cord was severed.

In fracture-dislocation, the deep fascia and muscles were usually torn transversely, the intraspinous ligament ruptured and one or more spines and laminae broken with varying amounts of angulation, dislocation and overriding. The articular processes sometimes prevented reduction and required removal. Hemorrhage was usually negligible and I do not believe that hemorrhage outside of the cord was actually causing compression in a single instance.

In many cases the cord showed little evidence of trauma other than compression to explain the physiological block. In others, however, the cord was swollen and hemorrhagic and recovery took place rapidly. Doubtless, the breaking of tracts can take place with permanent damage with little or no evidence of gross pathology. The cause of the fluid block was invariably found.

The cauda equina filaments were seldom torn in fracture-dislocation cases, but they were frequently pinched between bone fragments and nerve loops were found sticking out through a torn dura. The cases requiring suture of the cauda equina were in stab and gunshot wounds of the lumbar region.

CLINICAL COMPLICATIONS

The profound changes in physiology caused by serious injuries to the spinal cord must be anticipated and all available measures employed to correct them if we hope to keep these patients alive until recovery can take place.

Shock.—In this series shock was not observed except in a few cases in which associated injuries were responsible. In cervical injuries particularly, the patients were strikingly calm, reasonable and devoid of the usual physical components of emotional stress. This is doubtless due to interference with the autonomic-ductless gland mechanism, as Crile has pointed out in connection with his work in denervating the suprarenals. Though this seems odd it is not surprising, in the light of the fact that after cutting the pain and thermal tracts in the so-called cordotomy of the anterolateral columns, neither pain nor shock is observed.

The pulse is usually of vagotonic type, slow, full and regular. The blood pressure is usually maintained at normal level in spite of the extensive vasomotor and muscle paralysis.

Respiratory Difficulties.—When the injury is in the lower cervical region, paralysis of the intercostal muscles prevents thoracic respiration. The diaphragm alone is used, unless supplemented by the accessory muscles in the neck. The diaphragmatic center at the fourth cervical segment level is so near that rough handling is apt to result in prompt respiratory death. Late respiratory death comes on from an ascending edema or softening. Limitation of fluids and administration of 50 per cent glucose intravenously have not prevented this complication, which may occur after removal of pressure and in the presence of a negative Queckenstedt. Another type of respiratory failure is seen in cases where tight abdominal distention, against which the diaphragm must work, exhaust either the muscles or nerve centers resulting in a falling blood pressure and general cyanosis. This complication can usually be avoided by prevention or prompt relief of the distention.

Abdominal Distention.—The mechanism of acute abdominal distention in cord injuries is apparently an autonomic nervous system imbal-

ance, similar to the congenital type seen in Hirschsprung's disease. A predominance of holding nerves over emptying nerves is the same as is present in the case of the supply of the bladder, leading to acute retention. The amount of distention is variable. In some cases it is transient and of mild degree; in others the abdomen becomes quickly and incredibly tight, and no gas or fecal material is passed through a colon tube or with enemas.

If eserin is employed early, a colon tube used continuously and flatus enemas are given as required, accumulation of gas is usually not troublesome. When it becomes necessary, pituitrin or posterior lobe extracts, which act directly upon the intestinal muscles, are effective. In some cases, the distention becomes so great as to distress the patient and the interference with abdominal respiration threatens life. Therefore, if the above measures are inadequate, prompt relief may be obtained by injecting 25 per cent sodium chloride solution into the vein, 50 to 100 c. c. being given slowly. The powerful effect of hypertonic salt solution given intravenously was observed by Haden and Orr. Rapid and complete relief is obtained without any ill effect. A spinal anesthetic for relief has not been necessary.

The Urinary Apparatus.—In high injuries there is an initial suppression. This gradually gives way to a marked polyuria. Presumably, there is at first a vasoconstriction and later a vasodilatation of the kidney circulation.

There is at first a complete retention of urine, due to relative weakness of the emptying forces of the bladder and perhaps contributed to by the absence of the voluntary component in the complicated nervous mechanism of urination. After a few days or weeks, overflow takes place, especially if the bladder is allowed to become distended. Eventually, even if the cord has been severed, automatic control develops, the bladder emptying itself periodically more or less completely, and of course independent of the will. The stagnation of the urine and introduction of organisms by catheter will result in cystitis and later a pyelitis and pyelonephritis, unless the proper measures are begun promptly and kept up continuously. The initial use of uritone, followed by oral administration of urotropin constantly in an acid urine, has been almost universally effective in preventing urinary infection or limiting it to a negligible degree. When infection has taken place, an indwelling catheter with bladder irrigations has given prompt relief. I have never employed suprapubic drainage and do not believe that it is necessary in these cases.

During the period of oliguria catheterization should be avoided and when polyuria becomes marked, frequent catheterization or an indwelling catheter is necessary to take care of the tremendous output.

Thermal Disturbances.—In high cord injuries there is a loss of the pilomotor, vasomotor and sweating reflex below the level of the lesion. A rising temperature with hyperpyrexia is not uncommon. This has been attributed to a reflex disturbance of the heat center.

In attempting to supply artificially the surface cooling obviously needed, it was observed that even in hot weather hyperpyrexia could be avoided and the temperature readily controlled by varying the amount of surface wetting and the use of a fan.

When the environmental temperature is low, body temperature can be elevated by external heat, avoiding the use of a hot water bag, electric pads and other devices whose temperature is high enough to cause blistering.

The factors tending to elevate the temperature are the total absence of sweating over most of the body surface and diminished evaporation from the lungs due to the absence of thoracic respiration. The factors tending to lower the temperature or balance the above influences are almost total absence of movement, loss of tone in the flaccid muscles, slowing of the heart rate and interference with emotional response.

Decubitus Ulcers.—Bedsores are pressure ischemia necroses, due to the fact that blood is excluded from the tissues when they are pressed between bony prominence and a hard surface upon which the patient is lying. The lack of feeling prevents the discomfort which usually causes an individual to change position. This, together with the fact that the patient is paralyzed and moving is painful, leads to lack of circulation in the skin, fat and fascia, comparable to that in a limb with a tight tourniquet. The damage may be done in twelve to twenty-four hours if a patient is thin and allowed to lie on an unpadded or poorly padded frame, or a hard bed without being turned. It may take weeks for the tissue to slough down to the bone, leading to the erroneous belief that wetting is responsible.

The skin maceration and dermatitis due to soiling are superficial and inconsequential. The attention of the house staff and nurses must be

diverted from alcohol rubs, whose principal virtue lies in the fact that they require turning the patient, and focused upon the true cause of bedsore, which is prolonged pressure.

Muscular Atrophy and Contractures.—When the cauda equina is damaged, the legs require massage and electricity to prevent atrophy, as do the muscles supplied from the cord at the level of injury, particularly the intrinsic muscles of the hand in cervical injuries. If flaccid paralysis persists, posterior splints should correct the foot drop in order to prevent contractures.

REDUCTION AND FIXATION OF FRACTURED SPINE

Open reduction is attempted when laminectomy is indicated, extreme care being used in traction and manipulation to avoid further damage to the cord. I am convinced, from observing these under direct vision, that attempts at reduction are not safe before laminectomy except in cases of injury below the level of the first lumbar vertebra and in cases where the cord is certainly destroyed. If the fracture is reduced at operation, the Bradford frame is all that is necessary during recumbrance. Rapid correction of the deformity on a Roger's frame is not contraindicated after laminectomy and the position is maintained by immediate application of a plaster cast. Plaster is also applied where immediate closed reduction is employed. Approximately perfect replacement and alignment may be accomplished in this way.

ROUTINE METHOD OF HANDLING CASES WITH CORD INJURY

On admission, the patient is sent directly to the roentgenological department. While on the stretcher, physical and neurological examinations are made and antero-posterior x-ray films are taken while the patient is still on his back. He is then turned on his side for lateral films and lumbar puncture. If a laminectomy is decided upon, the stretcher is moved to the operating room and the patient is given preliminary drugs (barbituric acid derivatives and pantopon) while preparation is under way. The patient is then placed carefully face down upon the operating table with a cerebellar head rest. He usually comments gratefully upon the comfort of this position. Procaine hydrochloride is injected before draping, which allows sufficient time for anesthesia. The broken spine or laminae are removed, together with the one next above or below if it is pressing upon the cord. Reduction of the dislocation is carefully carried out by traction and manipulation. The dura is then opened, the cord inspected, clots are removed and the cord incised if necessary. The dura is left open if swelling or angulation cause it to bind upon the cord. The arachnoid is left in tact if possible or merely punctured. Closure is without drainage. The patient is then placed on his back on a Bradford frame covered by an air mattress not too tightly inflated. Traction is used in cervical injury.

POSTOPERATIVE CARE

Liquid or soft diet is given as desired, uritone intravenously is used if the patient has already been catheterized, hexamethylenamin three times a day is given indefinitely with the urine kept acid. Catheterization is done only when the bladder is full. Paralytic ileus is prevented by use of eserine 1/50 grain every six hours, colon tube and a cleansing enema every other day to prevent involuntary evacuation. In high cord injuries distressing distention may develop, requiring pituitrin or even intravenous administration of 25 per cent sodium chloride.

The temperature is kept near normal by the use of wet towels on the body and extremities, and a fan in hot weather. Bedsores are prevented by placing a soft air ring under the sacrum and soft pillows beneath the legs, keeping the heels from touching even the air mattress. The patient is turned "in one piece" to avoid rotation of the spine.

The surgeon must himself see that every detail is carried out, especially since most of these patients are ward cases without special nurses.

All hypodermics and intravenous medications are given in the anesthetic area to avoid pain.

RESULTS

The results of treatment of spinal cord injuries are discouraging, especially since the relatively mild forces involved in such accidents as riding beneath a barn door on a load of hay, being thrown from a horse and diving into shallow water have been replaced largely by the much greater trauma due to being catapulted and jack-knifed in high speed automobile wrecks.

In reviewing the early results in the last 121 patients with cord injuries on my service, I was rather agreeably surprised to find that 19 had recovered completely, 47 showed marked improvement and 55 had little or no return of function. The difficulty in adequate follow-up of end-results has made it necessary to consider only the hospital period and that immediately following. Some of these cases have made late

recoveries and others have died of complications, but no accurate figures are available.

Of the 121 injuries, 84 were associated with fracture-dislocation of the spine, 33 were due to gunshot and stab wounds, two were birth injuries and two were due to traumatic dislocations of intervertebral discs.

In all, 35 died. Sixty-nine were operated upon, 60 under local anesthesia. Of the 60 laminectomies, 11 died (18 per cent). The immediate causes of death were: respiratory, 2; paralytic ileus, 1; internal injuries, 1; traumatic pneumonia from chest wound, 3. Excluding the cervical cases, six of the surgical cases died (10 per cent).

CORD INJURIES DUE TO FRACTURED VERTEBRAE

Total cases	84
Fluid blood tinged	38
Complete physiologic block	64
Partial physiologic block	19
Queckenstedt test positive	70
Immediate operations	49
No operation	32
Late operation	3
Laminectomy	52
Orthopedic measures only	32
Total mortality	22

There were no deaths on the table or within a few hours afterwards. There were no infections and no cases of leakage of spinal fluid. In none of these cases did the surgical interference appear to make the patient worse, either neurologically or as far as the general condition was concerned.

In spite of the routine described above, one patient developed a serious urinary infection and four had small bedsores due to relaxation in care. One patient died of hyperpyrexia before its cause was appreciated.

My impression is that, in spite of the small percentage that can be saved, immediate laminectomy when indicated and a determined effort to prevent complications in these patients are worthwhile.

DISCUSSION (*Abstract*)

Dr. C. C. Coleman, Richmond, Va.—The only indication for operation in cases of spinal cord injury, associated with fracture-dislocation of the spinal column, is seen when there is pressure upon the cord, which is not already destroyed at the level of the injury. Information as to the presence or absence of pressure upon the cord may be obtained by the Queckenstedt test if it is properly done. It is true that the Queckenstedt test may be positive in some cases in which the vertebral segments have recoiled into alignment and the cord has been destroyed by the force of dislocation. It will happen, therefore, that operation will be done upon some of these cases because of the presence of a positive Queckenstedt test, when the patient has a hopelessly crushed cord.

Since 1923 I have used the Queckenstedt test as the main criterion of operation for severe cord injuries. In no case where the test is negative have we operated upon patients with acute spinal cord injuries, regardless of the degree of paralysis. We usually supplement the Queckenstedt test with injection of air through the lumbar puncture needle. If headache is immediately produced, or if it does not take place, we have additional information upon which we can decide as to the absence or completeness of the block. The air moreover outlines the lower border of the compression, while the escape of fluid above, shows the upper limits of the compressed cord segments. So that between the escape of fluid above and the visible subarachnoid air below, the whole length of the compressed cord segment can be readily determined. X-ray studies alone are usually inadequate to determine whether or not the cord is pressed upon, except in case of exaggerated dislocation. I do not agree with Dr. Semmes that all incomplete injuries should be operated upon when a subarachnoid block is present, and I am sure he intended to convey the idea that he operated upon cases with block only if the injury were severe. If there is a block, as shown by a positive Queckenstedt, and the injury is very mild, I should repeat the Queckenstedt test and wait for progression of symptoms before doing a laminectomy. While a partial block, as demonstrated by the Queckenstedt test, is an indication for operation in spinal cord tumor, which is a progressive lesion, we feel that nothing less than a complete block is an indication for operation in spinal cord trauma.

Dr. R. B. Wilson, Atlanta, Ga.—There is little doubt that these patients with complete "fluid block" should be operated upon without delay. On the other hand, a hopeless attitude is usually adopted towards those with signs of a complete transverse lesion of the cord, and the problem becomes purely one of nursing, the chief concern being to delay the development of bed sores, infection and such complications. Would not an operation in such a case be justified if it offers any hope of benefit or if it might increase our knowledge of physiological and reparative processes? Charcot has written a great deal on the subject of nerve and spinal cord injuries. He believes and has offered cogent arguments for it, that the resulting trophic disturbances are not due alone to loss of nerve action and that bed sores are not due alone to pressure but depend for their development, to a considerable degree, on trophic disturbances that are caused by nerve irritation at the site of the lesion. He has presented clinical and experimental evidence that when a nerve is contused or implicated as in an inflammatory process, the muscular atrophy is far more rapid than when there is a clean and complete section of the nerve. Bed sores have been observed in hemiplegia and developed on the paralyzed side although that side was not permitted to come in contact with the bed. It is his observation in lesions involving half of the cord that the bed sore develops not on the paralyzed side but on the opposite side.

If these conclusions are well founded an operation that would remove any foreign material and the macerated cord tissue should reduce the incidence of distressing genito-urinary disturbances and bed sores.

If it becomes established that nerve irritation, that is, contusion that might lead to an aseptic inflammatory reaction, does lead to more rapid muscular atrophy and more pronounced trophic disturbances, much time

and function might be saved in dealing with peripheral nerve lesions. At present the inclination is to wait to see if the proximal nerve fibers will grow out and re-establish function. If it can be shown that nerve irritation is as important a factor as Charcot believes then rapid atrophy and pronounced trophic disturbances would indicate the need of an immediate operation.

This may appear radical, but there is the remote prospect of benefit in an otherwise hopeless case and at least the more definite prospect of adding to our knowledge of physiological and reparative processes.

Dr. C. C. Turner, Memphis, Tenn.—The scope of Dr. Semmes' paper is limited to massive injuries to the cord which are of chief interest to the surgeon. The neurologist is not infrequently confronted with symptoms and signs referable to the spinal cord following injuries. These symptoms and signs point to definite organic changes within the spinal cord and are so far out of proportion to the trauma suffered by the patient, that they should be considered in any discussion of the spinal cord injuries.

It has been demonstrated by strapping a rabbit with its back to a board that if this board be struck lightly but continuously with a small hammer, subsequently the rabbit will develop paralysis, spasticities, rectal and bladder incontinence, and other signs common to spinal cord injury. We have seen a case which presented the picture of combined degeneration of the cord which was definitely the result of trauma, and yet this trauma was not that of direct violence to the spinal column, but was transmitted up the spine from a fall in the sitting position. When we consider the consistence of the spinal cord enclosed in its bony tube, the spinal canal, it is not difficult to visualize the dire results which may result from the addling and jarring of a delicate structure like the spinal cord.

This condition may frequently bring up the question of court procedure involving damages and, therefore, it is important from its medicolegal aspects.

THE HERXHEIMER REACTION, AN AID TO TREATMENT*

By C. P. BONDURANT, M.D.,
Oklahoma City, Okla.

The purpose of this discussion will be to offer some observations on the Jarish-Herxheimer reaction in the relation that this process has to the treatment of early syphilis, with special reference to acquired immunity. It will be the contention that this reaction should be welcomed in early syphilis as an aid to treatment. Jarish, in 1895, published a long series of cases of secondary syphilis in which the eruption became more marked and distinct following the daily administration of mercury inunctions. This was before the advent of the newer pathology of syphilis. Little attention was given this observation even after it was confirmed by Jadassohn until Herxheimer, in 1902, published a very complete account of it. He noted that in cases of syphilis in the secondary stage, following the injection of an insoluble mercury salt, within 15 to 24 hours a change appeared in the skin rash and the lesions became more prominent and larger. New lesions, formerly not noticed, became apparent and some of the older lesions changed in color. He observed that these changes occurred with the first dosage and not after the second and subsequent doses, and showed that it was not due to mercurial poisoning. After the advent of arsphenamine Finger described in detail the same process following its injection and noted the only difference to be a more marked reaction in all its phases due to the higher specific nature of the drug employed. From this time the reaction has become widely known as the Jarish-Herxheimer reaction. Since it is the purpose of this discussion to justify the intentional production of this reaction as an aid in the treatment of early syphilis, I wish to call your attention to the basic pathology of syphilis in its relation to early acquired immunity. When the spirochetes are successfully implanted, what takes place? As soon as they have acclimated themselves to changed nutritional conditions at the site of entrance, as has been shown by Levaditi and Yamanouchi, they multiply, call forth microscopic changes in the cutaneous structure and enter the lymph and blood stream. Just the extent of this penetration of the organisms beyond the local sore and the immediate lymph nodes in the human subject in this stage of syphilis is not known. However, it has been shown by Neisser that the spleen and bone marrow of inoculated monkeys contain the virus thus early in the disease. As the initial lesion takes on the well marked steps of its formation, a peculiar reaction on the part of the host is also developing. In its inception this reaction is only feeble, and the individual is for a limited period of time capable of developing reinfections. Much information lately has been accumulated on this phase of syphilis, especially from the work of Brown and Pierce, Chesney and others. The initial work of any importance was done by Neisser with the formation of the Neisserian doctrine of reinfections and immunity. It is evident from these observations that many forces come in for consideration in this connection, such as relation of the virulence of the organism to the susceptibility of the host, and the type of the superinfecting strain of organisms as to whether it is homologous or heterologous. In other words, a con-

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sideration of the total process of immunity production, which, to date, is none too well understood, is the question at hand. Not rarely in clinical practice we see patients with multiple chancres. In some cases they develop simultaneously as the result of multiple inoculation; in others they appear successively either from auto-inoculation or contamination with a fresh virus. Clinical and experimental observers have recorded opinions that the lesions of super-infections do not develop in the typical manner of those of primary origin. They have an altered period of incubation and their clinical appearance resembles that of the stage of the disease at the time of their appearance. These lesions then are without question an expression in the tissues of the host to an altered disease reaction. It has been the experience of those who closely study the early diagnosis of syphilis by dark field examination and other laboratory considerations that the spirochetes leave the primary lesion at about the time of the appearance of the secondaries. That is, at about the end of the fourth and during the fifth week of the infection these organisms are demonstrated microscopically only with much difficulty. It is also noted that the serum taken from an initial lesion produces a positive Wassermann reaction sooner in the course of syphilitic disease than does the ordinary blood serum which tends to show that the disease process is in a higher state of activity at this local site. The hypothesis has been advanced by Krause and Volk that this process is one of immunity of a regional development and gradually involves the mucous and cutaneous covering. During this second incubation period the number of spirochetes gradually develops and reaches its maximum with the tissue expression of the secondary rash. With it has increased this same expression in the development of the acquired immunity. This immunological principle or this healing force causes the chancre to progress to a complete state of healing and, after a varying period, the lesions of the secondary rash likewise fade and the relation of the host to his infection becomes more or less that of a state of symbiosis. Clinically, this protection from infection persists and disappears only with the cure of the disease when the patient again is in a receptive condition. This immunity, then, is slow in its course and incomplete in its protection, as it is the product of a disease which does not come on with an activity acute enough in its course to produce a lasting active immunity. This basic assumption first expressed by Finger and later confirmed by Neisser is that in syphilis there is no immunity without infection, and when the virus is destroyed the immunity passes. Chesney chooses to differ with this conception of immunity and offers convincing experimental evidence to the conclusion that this process is more far-reaching in its force. There is a wide difference of opinion both of clinical and experimental students as to the exact nature of this immunological principle, which is only good evidence that little is really known of the exact tissue mechanism of this state of resistance. Whether it is brought about by the tissue, the cells, the serum, or whether it is the product of intermediary organs is a question. Basically, organisms or their toxins when introduced into the body behave as antigens and stimulate the formation of antibodies which are specific for that particular bacterium. These may assume the nature of antitoxins which neutralize the toxins, opsonins which lead to the ingestion and destruction of organisms by the leucocytes, agglutinins which cause the organisms to adhere together, or bacteriolysins which cause their destruction by dissolution. Neisser believes this process to be a complement-binding and agglutinating substance of a specific nature. Levaditi, however, is of the opinion that since the spirochetes, even before the evolution of the initial lesion, may enter the hematopoietic system they act like true antigens and their products of secretion stimulate the formation of antibodies. He is willing to assume an analogy between these immune bodies and those of related diseases when bacteriotrophic substances and opsonins bring about the destruction of infections. To say the least, this state of acquired resistance does unquestionably develop in the lesions of the syphilitic in the course of his disease and represents a profound change in the body and sends protection in a wide distribution to many tissues. This protecting force which develops in the course of syphilis may be considered to maintain itself at different levels or at varying orders of magnitude, thus accounting for the behavior of syphilis in its later course which makes it the recurring disease *par excellence*. These flare-ups may be accounted for in the latent period when the general protective forces of the body are called

to care for some other result such as trauma or another disease. It has been noted in the clinical course of syphilis that when the patient presents an unusual reaction at the site of the primary infection he rarely develops heavy secondaries. This led Brown and Pierce to experiments based upon this principle from which they formulated their law of inverse proportions. When this same thought is carried to syphilis in the secondary stage we are forced to recall the old Fournier dictum that patients in whom secondary symptoms are overlooked or are very mild, later show a tendency towards nervous system involvement. This observation may also be carried into other forms of tertiary syphilis and found to be true. At best, then, when we consider acquired immunity in the syphilitic we are obligated to be mindful of the fact that in this disease we are working with an organism which is incapable of setting up a reaction in the host of sufficient violence to eliminate the infecting agent rapidly and completely. If the host were capable of bringing about such a reaction there would be more general constitutional symptoms, a shorter clinical course, and a more lasting protection. It then behooves the clinician to aid the host as much as possible by utilizing for the patient's benefit the best immunity he is capable of producing, so that when we come to consider the therapeutic procedure the process known as acquired immunity must not be passed over lightly. It will be remembered that in the first two stages of syphilis, beginning with the initial infection, the patient has a gradual increase in the number of spirochetes in his system, reaching the maximum in numbers in the secondary stage. The whole clinical course of early syphilis bears out the observation that there is little immunity without reaction, and this is also a basic principle of vaccine therapy. Then, in the normal course of early syphilis when the patient is literally swarming with spirochetes, if we give him a sufficient dose of a spirocheticidal remedy to bring about a reaction, the Herxheimer reaction, we have then killed in this patient's system enough of these infecting organisms which liberate an endotoxin in enough quantity to bring about this sharp reaction at the sites where most spirochetes are gathered, and with this the production of constitutional symptoms. The endotoxin or antigen in turn stimulates the production of an antitoxin or antibody, which is the basis of the protecting mechanism commonly known as acquired immunity. In other words, we have given the patient a dose of his own dead spirochetes, which in turn bring about this bodily reaction which is very similar to that seen when we give the patient a dose of typhoid vaccine; but in one case the infecting organism is not capable of producing as lasting an immunity as in the other. It has been previously taught that this is a reaction to be avoided in the treatment of all syphilis. I cannot too severely condemn it in the treatment of late syphilis, but, on the other hand, I feel that it has a distinct therapeutic value in the management of early syphilis, not only as an aid in eradicating the infection, but, more important, as a general protecting mechanism in the late manifestations of the disease. I wish to make a report of a short analysis of 53 cases of syphilis thus treated.

ANALYSIS OF CASES

In order not to produce an artificial conception of the meaning of the Herxheimer reaction in relation to syphilis and its treatment, I wish to adopt the following method of approach. By the Herxheimer reaction, I mean that the patients included in this group presented, following a dose of arsphenamine or neo-arsphenamine, a flare-up of some or all of their syphilitic symptoms. In primary syphilis there was a flare-up in and about the primary lesion with some headache and other signs of general toxemia; in secondary syphilis, an intensifying of the skin picture, and in early secondaries a production of a mild rash where none existed before, a headache and more marked symptoms of a general toxic state. All patients considered in this group were proven undoubtedly to have had syphilis. The 53 case records are taken from the files of my office. Of the cases reported all were advanced far enough in the course of their disease to produce a positive blood Wassermann reaction. Forty-one of the 53 cases were in the distinct secondary stage. Twelve were in the late primary stage. Of the primary cases, 4 were females and 8 were males. Of the secondary group of 41 cases, 26 were females and 15 were males. The patients ranged in age from sixteen to forty-seven. The average age of the entire group was twenty-nine. The patients were all white. This entire group of 53 patients has been under observation from one to five years. Following the definite diagnosis of syphilis the patients were all given a

dose of arsphenamine with the idea of producing in each particular case a Herxheimer reaction. This dosage varied according to the size of the patient and the severity of the disease. The dosage of neoarsphenamine ranged from 0.45 to 0.75 gram; of old arsphenamine, from 0.2 to 0.4 gram, and in all of the cases a definite Herxheimer reaction as described was produced. In 4 of the male patients in the secondary group a very mild Herxheimer reaction was noted on the second dose. No semblance of a reaction was noted on subsequent treatment in any of the cases. From this point the regular administration of bismuth, mercury, the arsenicals and iodides with rest was carried out according to the general conception of the usually accepted management of syphilis in the primary and secondary stages. All of the patients were advised at their first treatment that their symptoms would probably become intensified and that they might have some headache and general reactions. Care was instituted in the selection of these cases in that in no instance was the disease of more than four months' duration: no case thus treated had had any previous treatment; and there were no cases of the relapsing type. In other words, of the cases reported in this group, each represents the normal course usually seen in syphilis of the early stages. The complications in connection with this group were: a mild arsenical dermatitis in one woman patient in the secondary group and a slight arsenical neuritis manifested by a few leg pains and tingling in the fingers and feet of one man in the secondary group. This same group of neurological symptoms was noted in one girl in the primary stage. The maximum total amount of arsenical given in the first course of treatment to any one case was 5 grams; the minimum was 3.3 grams. There was one re-infection diagnosed by dark field examination from a small penile lesion in one man who 3½ years before had had a late primary lesion with a positive blood Wassermann and had been treated for 1½ years following. Of these 53 patients thus treated, 46 were serologically negative at the end of the first 6 months and all were negative at the end of the first 9 months of treatment. The blood Wassermanns were all made following a rest period of one month in each case. Seventeen patients of the entire group submitted to spinal puncture. These were done within from 1 year to 18 months after starting treatment. They were all negative. The tests done on the spinal fluid were: the Wassermann reaction, colloidal gold, cell count, and globulin. Four of the cases have had a second spinal puncture at an interval of from 1 year to 15 months following their initial spinal fluid examination. These were all negative with the same tests. The general condition of this entire group of patients has remained essentially good throughout this period of observation. Three of the women have gone through normal pregnancies and have delivered well developed, healthy and serologically negative babies.

DISCUSSION (*Abstract*)

Dr. J. Richard Allison, Columbia, S. C.—Dr. Bondurant is to be commended for a very thorough analysis of the present knowledge of the development of immunity in the treatment of syphilis. His paper brings out the importance of the early, intensive and proper treatment of syphilis in relation to our present knowledge of the best means of developing a permanent immunity against the spirochete. The Herxheimer reaction, when present, seems to indicate some special reaction in cases of early syphilis that enables the host to acquire an early and more lasting immunity with a given dose of medicine than a second individual who does not have the reaction. This reaction should not be confused with the poisoning which sometimes follows the use of the heavy metals.

Dr. Chas. O. King, Birmingham, Ala.—Dr. Bondurant's report of the unusually large number of negative Wassermanns, almost 100 per cent, in patients who had the Herxheimer reaction is interesting. Formerly this reaction caused us much worry, although we should apparently welcome it as a good prognostic indication.

I have not been quite so fortunate as Dr. Bondurant in my end-results. A young lady who, in my opinion, showed a definite Herxheimer, was given the whole course of treatment, which consisted of ten injections each of arsphenamine, mercury and bismuth. One month later she still showed a plus 4 Wassermann.

Dr. A. H. Lancaster, Knoxville, Tenn.—In young patients without any organic changes I have been getting and welcoming the Herxheimer reaction for the past three or four years. I am particularly interested in one phase of the reaction, that is, the chill. From my observation it appears that the end-results in patients who have a chill are better than in those who do not have it. The first arsenical received is of the average dose for that particular individual, taking into consideration age and weight, and it is usually given between 4 and 7 o'clock in the afternoon. This patient is advised to go directly home and to be prepared for a chill. He is told that if it develops he should not be alarmed and that a chill is not to be expected after the first injection if he will be regular with his treatments. The chill usually develops about four hours after the injection. I have been able to produce such chills in about 90 per cent of the cases in which I anticipated it. Some of my most severe chills have developed in patients with a positive darkfield and a

negative Wassermann reaction. If they have fading secondaries the reaction is not so severe as a rule.

Dr. Fred D. Weidman, Philadelphia, Pa.—Dr. Bondurant has been both courageous and ingenious in applying the lessons gathered from the Herxheimer reaction in a practical therapeutic way. It was not quite clear to me how frequently and how consistently he was able to induce the Herxheimer reaction. It may be in point to remark that improvement in the progress of the lesions of syphilis (gummas) can be secured by foreign protein therapy, such as has been called to our attention by Greenbaum. However, whereas the lesions regress there is not any improvement serologically. Perhaps the added improvement secured by the Herxheimer effect is of the same order as the foreign protein one.

Dr. J. Lee Kirby-Smith, Jacksonville, Fla.—At the Washington meeting of the Southern Medical Association of our Section on Dermatology in 1926, Dr. Marshall, of Memphis, presented a paper dealing with arsphenamine reactions. In discussing this paper I mentioned having recently had a patient with a very severe toxic reaction. Later events disclosed that its cause was an accidental administering of 0.6 gram of arsphenamine without any neutralization and with only 5 c. c. of water, because we were under the impression at the time that the preparation administered was neoarsphenamine. No doubt quite a number of the severe reactions reported could, on thorough investigation, be attributed to some error in the technic of the treatment. In the discussion just mentioned the patient had a pronounced Herxheimer reaction. After recovering from the effects of the injection, even with a deficiency in the amount of treatments, the patient today remains serologically negative.

In the early period of arsphenamine treatment of syphilis, one quite often obtained the Herxheimer reaction. Though undesired, it was later thought to have been of decided benefit in the control of the disease. Nevertheless, I do not see how we can, as routine treatment, bring about a Herxheimer reaction for accelerating the treatment of syphilis. I think Dr. Bondurant's observations are interesting and worthy of further consideration.

Dr. Bondurant (closing).—This paper of course is merely a presentation of a principal in therapy that hitherto has been taught to be a dangerous reaction. Syphilis has always afforded a great deal of interest to me from an immunological standpoint, and I wish to point out that a basic fundamental immunity underlies this infectious disease just as with other infectious diseases. I have produced the Herxheimer reaction purposely in many cases of early syphilis, and have found that these patients get along better than those in whom the reaction was carefully avoided. I feel that this reaction will aid the therapist to give his patient the best protection which can be afforded, not only to cure him of the existing lesions, but to produce for him a defense from the later inroads of the disease. There seems to be considerable misunderstanding of the true Herxheimer reaction and drug reactions. These should not be confused.

PEPTIC ULCER*

A REVIEW OF 515 PRIVATE CASES

By L. CARL SANDERS, M.D.,
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The symptoms of peptic ulcer were first described almost a century ago. In 1847, Wood,[1] in writing on "inflammation of the stomach," said:

"In almost all cases there is more or less epigastric uneasiness. This generally amounts to pain, being sometimes acute, lancinating, sometimes slight or dull. Frequently there is a sense of heat or burning which may extend up the esophagus. Instead of pain there is often a feeling of fullness, or of weight, or of gnawing at the epigastrium, which is for the most part sore when pressed. The sensation is seldom constant, but has remission. It commences at a definite period after meals and disappears when food is taken.

"In the late stages, vomiting is a frequent attendant. In some cases it attains such a degree that not a meal can be swallowed without being discharged. The matters vomited are food, bile, mucus, acrid liquors which excoriate the throat in their passage, and, in some instances, blood mixed or unmixed, fresh or altered by gastric juices. Vomiting often relieves the distress in the stomach and many patients acquire the habit of drinking liquids and vomiting to relieve their distress.

"The duration of the disease is usually considerable, not infrequently for years. It seldom marches steadily forward, but is liable to frequent changes, the patient sometimes approaching to recovery and then relapsing and going through this alteration several times before recovery or death.

"Every now and then a case occurs in which the patient, previously in tolerable health, is suddenly seized with severe abdominal pain and dies with all the phenomena of peritonitis. Dissection at autopsy reveals an ulcerated opening in the stomach."

This word picture by Wood, written eighty-five years ago, is a classic description of peptic ulcer. The symptoms he recognized were:

(1) Chronicity
(2) Periodicity
(3) Hyperacidity
(4) Hunger pain
(5) Food relief

In addition to the symptoms, he described the complications which are recognized as

(1) Hemorrhage
(2) Obstruction
(3) Perforation

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Thus, for nearly a century little has been added to our knowledge of the symptoms or methods evolved to prevent complications.

In a search for information concerning the more efficient management of peptic ulcer, 515 of our private case histories of ulcer, recorded between 1920 and 1930, were studied. Only those diagnosed by the roentgenologic study are included in the series. Thirty-five patients with a clinical history of ulcer but negative roentgenologic findings were excluded.

Chart 1

	Number Patients	Per Cent
Duodenal ulcer	472	91.5
Gastric ulcer	30	5.9
Gastric and duodenal	5	1.0
Duodenitis	8	1.6
Total	515	100.

The number of duodenal ulcers (91.5 per cent) is somewhat higher than is found in the average series. In our experience gastric ulcer is comparatively rare. Five patients had both gastric and duodenal ulcers. The gastric ulcers were near the pylorus, and in three instances involved the pyloric ring though definitely separated from the duodenal callus.

A diagnosis of duodenitis was made in 8 cases. In each of these the clinical picture was that of ulcer, but the roentgenologic appearance suggested duodenitis.

Kirklin[2] reported the roentgenologic signs in 45 cases of duodenitis. His observations included (1) irritability of the duodenal blub with a tendency to quick but not complete emptying, (2) grossly deformed, spastic, skeleton-like cap, and (3) absence of a definite persistent niche.

Chart 2

		Sex	
Number Patients	Average Age	Males	Females
515	42	354	161

The average age of all our patients was 42 years. The youngest was 19, the oldest 78. Seventy per cent were males and 30 per cent were females.

Chart 3

Average duration of symptoms (years) 6.5

Complaints

	Number Patients	Per Cent
Hunger pain	472	91
Food relief	470	91
Seasonal recurrence	409	80
Sour brash	295	57
Colic	137	27

The symptoms had persisted for an average of 6.5 years. The shortest period was 1 week, the longest 30 years. The patient whose history dated back 30 years had suffered periodically for 5 years, then had a remission for 25 years. The first symptom of recurrence was a profuse hemorrhage. He was treated surgically 7 years ago. The ulcer was quite large and showed evidence of long-standing activity.

As shown in *Chart III*, 91 per cent with hunger pain were relieved by taking food; 80 per cent had definite recurrences in the spring and fall, with remissions during the summer and winter seasons; 57 per cent belched or vomited sour material; and 27 per cent had colic ranging in severity from mild epigastric pain to acute generalized cramps.

Chart 4

Gastric Analysis	Number Patients	Per Cent
Gastric analysis done	365	71
Gastric analysis not done	150	29
Total	515	100
Free HCl		
Above normal	210	57
Below normal	61	17
Normal	76	21
Absent	18	5
	365	100

Mann[3] has been able to produce ulcers in dogs almost without fail by sidetracking the duodenum. The upper end of the jejunum is attached to the pyloric end of the stomach and the lower end is joined to the distal end of the ileum. The contents of the stomach pass directly into the jejunum, in which there is no bile, no pancreatic juice, and no duodenal secretion of any kind, as these are passed into the duodenum, which is made to empty into the lower ileum. The ulcers become chronic and are identical histologically with the ulcers seen in human beings.

If the duodenum is restored to its normal position and the stomach contents routed through the normal channel, the ulcer rapidly heals.

This seems direct proof that failure to neutralize secretion is a reason for the development of ulcer.

Practically all our early and uncomplicated ulcers gave a high acid curve. The rule held that the longer the duration of symptoms, the lower or more nearly normal became the acid curve. The free hydrochloric acid was above the normal 35 per cent to the 100 c. c. of

gastric contents in 57 per cent of the patients; below normal in 17 per cent; normal in 21 per cent; and absent in 5 per cent. Those with normal or low acids had either pyloric obstruction, cholecystitis, or some constitutional disease which could explain the low acidity.

Chart 5

Focal Infection	Number Patients	Per Cent
Diseased tonsils	375	73
Tonsils previously removed	81	16
Tonsil disease not recorded	59	11
Total	515	100
Dental infection	305	60
All teeth previously removed	46	9
Dental disease not recorded	164	31
Total	515	100

Reeves[4] has shown that, because of the peculiarities of the arterial blood supply to the ulcer-bearing areas in the stomach and duodenum, these regions are more susceptible to attack by infection than any other portions of the digestive tract.

Rosenow[5] has produced peptic ulcer in 75 to 80 per cent of animals by liberating ulcer strains of streptococci into the circulating blood. He also demonstrated that an emulsion of a freshly excised, macerated peptic ulcer injected into the ear of a rabbit will frequently produce an ulcer in the stomach or duodenum. The same results were obtained by the injection of the macerated pulp of an infected tooth or a diseased tonsil.

There seem to be two separate and distinct etiologic factors in the production of ulcer. The first is a stimulus or irritation which starts the abrasion or ulceration. The second factor is the one which makes the lesion become chronic. It is believed that infective foci acting upon tissue with diminished blood supply produces a zone of lowered resistance. This is further abraded or inflamed by irritating secretions and ulcer forms as a result.

In *Chart V*, 73 per cent of the patients of this series are shown to have harbored infection in the tonsils and 16 per cent had previously had their tonsils removed. The majority of the latter group had tonsillectomy subsequent to the onset of ulcer symptoms. Sixty per cent had demonstrable dental infection, and 9 per cent wore full dentures.

It seems reasonable to assume the possibility of a secondary infection in the stomach or duodenum from a primary focus in the oral cavity.

Chart 6

Appendicitis	Number Patients	Per Cent
Appendices in	402	78
Appendices out	113	22
Total	515	100

Braithwaite[6] has observed a direct connection between the lymph nodes of the cecum and appendix and the pyloric end of the stomach. He believes that absorption of toxic material from the cecum and small intestines may cause inflammatory changes at the outlet of the stomach.

For many years surgeons have observed infection in the appendix at the time of operation for peptic ulcer. From *Chart VI* it will be seen that 78 per cent of these patients retained their appendices and 22 per cent had had appendectomy. A diagnosis of chronic appendicitis, in addition to ulcer, was made in 90 per cent of the first group, the majority of whom were operated upon for appendicitis after the onset of ulcer symptoms.

Chart 7

Complications	Number Patients	Per Cent
Hemorrhage	88	17
Obstruction (acute and chronic)	46	9
Perforation (acute and chronic)	16	3
Total	150	29

The chief sources of danger in peptic ulcer are hemorrhage, obstruction, perforation, and malignancy.

Hemorrhage.—The most common complication of ulcer is hemorrhage, from erosion of a blood vessel. It may occur in any stage of the ulceration, is often seen in the early phase, and recurrences are the rule rather than the exception. Also, hemorrhage may appear suddenly during a quiescent period without any of the symptoms of ulcer. Slight bleeding may occur and pass unnoticed. Moderate hemorrhage will usually pass through the bowel and be evacuated as tarry stools with little evidence of weakness or anemia. Massive hemorrhage is preceded by faintness and weakness even before hematemesis or melena occurs.

Fresh blood in the stools or the passage of red blood from the rectum usually means some ulceration in or near the rectum. The blood from an eroded vessel in a peptic ulcer is partially digested and is tarry in color.

Chart VII shows the incidence of hemorrhage in this series to be 17 per cent. In the ma-

jority of these, hematemesis and tarry stools were preceded by faintness and weakness. There were no deaths from hemorrhage.

Obstruction.—Obstruction is caused by extension of the ulcer callus around the lumen of the viscus, by muscle hypertrophy from spasm, and by perigastric and periduodenal inflammation. The process is slow in developing, but the symptoms may have an abrupt onset.

A history of ulcer, followed by a continual sense of fullness and distress when the stomach should be empty, a lack of appetite and nausea, eructation of sour material or vomiting of large quantities of undigested sour food which has been in the stomach for an over-long period, and rapid loss of weight, make the diagnosis of obstruction almost certain. A barium meal which is retained, wholly or in part, for more than six hours leaves no question as to the diagnosis.

In our series 9 per cent gave clinical and roentgenological evidence of obstruction. Five-hour observation on the stomach after a barium meal was not done in all cases, which accounts for the low percentage of obstructions found.

The obstruction may be of varying degrees. A number of these patients had almost complete obstruction with retention of all solid food. The stomachs were large and emaciation was pronounced.

Perforation.—The first symptom of acute perforation is the sudden onset of violent epigastric pain. Later the pain spreads over the entire abdomen, but may be more severe on the right side. The abdomen becomes rigid and extremely tender. A classical symptom is the patient's immobility. He desires to be left alone and resents the touch of the examining hand. In no other abdominal catastrophe is this sensitiveness so pronounced. Shock is evidenced by a rapid small pulse, cold perspiration, and subnormal temperature.

Chronic perforation with a pin-point opening may cause only a transient acute pain. The omentum or other viscera seal the opening quickly, allowing only a minute quantity of intestinal contents to escape into the peritoneal cavity.

In our series, 3 per cent had perforations, as shown in Chart VII. With one exception, the diagnosis was made before operation in every case. This patient had a pin-point perforation of the ulcer with a small leakage which gave rise to intermittent cramps, simulating appendicitis.

Carcinoma.—It is the opinion of various authors that carcinoma occurs in from 5 to 50 per cent of gastric ulcers. This question cannot be decided unless there is proof that the cancer developed at the site of a pre-existing ulcer. Carcinoma of the stomach, however, is common and is found more often than gastric ulcer. We observed 77 cases of gastric cancer and 35 cases of gastric ulcer over the same period of time.

Carcinoma of the duodenum is a rare complication and is believed by some clinicians never to occur. We have not encountered a single case in more than 10,000 gastro-intestinal studies during the past ten years. There were 5 patients, however, with carcinoma of the stomach and an associated duodenal ulcer.

The fundamental principles of treatment are:

(1) Removal of the cause
(2) Healing or removal of the ulcer
(3) Restoration of the normal function of digestion

All foci of infection should be carefully removed. If medical management is undertaken, the foci should be eliminated at once. If there are complications which demand surgical treatment, the foci should not be removed until after convalescence. Neglect in removing foci will often prevent a cure, regardless of the type of treatment carried out.

The second basic principle is the healing or removal of the ulcer. Keen judgment is necessary in choosing the treatment best suited to the individual case. It is wise to determine whether the patient should be treated medically or surgically.

MEDICAL MANAGEMENT

The objects to attain in treatment are:

(1) Relief of pain
(2) Promotion of healing
(3) Relief of gastric spasm
(4) Reduction of acidity

Diet.—The fact that there are numerous diets on record for the treatment of ulcer indicates that dietary measures alone have not been entirely successful.

For the first week a liquid diet is indicated. A mixture of two-thirds whole milk and one-third cream, taken every hour from 7:00 a. m. to 9:00 p. m., will satisfactorily control the symptoms of the average patient. After the first week, soft foods may be taken at regular meal hours and the milk and cream mixture every two hours between meals. The soft foods

best suited to the average patient are: soft-cooked eggs, baked or boiled custard, well cooked cereal, baked or boiled potatoes, junket, dry or milk toast, creamed breast of chicken, scraped beef, tender vegetables, such as green peas, squash, spinach, creamed carrots, and egg plant mashed through a sieve, and strained orange or tomato juice.

After the third week a more liberal diet may be added, including string beans, okra, stewed tomatoes, cottage cheese, cooked fruit, strained vegetable soup, creamed tomato or pea or potato soup, baked chicken, turkey, fish, broiled steak, mutton or veal. This diet is balanced sufficiently to be taken indefinitely. Over-eating or indiscretions in eating should be strictly prohibited. A single debauch in diet may undo the work of weeks of treatment.

Drugs.—If the acids are high, alkali powders should be taken one-half hour after each meal. Constipation can be controlled by the addition to the powders of enough heavy oxide of magnesia to promote daily evacuations. Tincture of belladonna taken to the physiologic limit relieves spasm and increases comfort. Gaither[7] has obtained good results by the use of a mixture containing belladonna, hyocyamus, and bromides.

Tobacco and alcohol, even in moderation, stimulate peristalsis and induce gastric spasm. They should be strictly avoided.

Rest.—Experience has shown that the average patient with peptic ulcer cannot spare the time for an extended rest. Ambulatory treatment of the uncomplicated ulcers has proven almost as satisfactory as rest in bed.

If the patient is not relieved by medical management, probably some other disease is present, such as cholecystitis or appendicitis, or other foci of infection. When medical means fail to relieve the symptoms of ulcer, the case should be reviewed to determine whether any previously overlooked pathologic change exists.

SURGICAL TREATMENT

The indications for surgical treatment usually are:

(1) Failure of medical treatment
(2) Multiple or massive hemorrhages
(3) Pyloric obstruction
(4) Perforation
(5) Malignancy
(6) Coincident symptomatic cholecystitis or appendicitis

Peptic ulcer naturally tends to produce symptoms periodically. If this occurs regardless of strict medical management, surgical intervention is advisable, provided the recurrent symptoms are sufficiently severe to warrant such a procedure.

Recurrent hemorrhage indicates extension of the ulcer and erosion of the blood vessels. Massive hemorrhage is dangerous to life, although death from the actual loss of blood is uncommon.

At the onset of a hemorrhage the patient should be put to bed. Nothing should be given by mouth. Hypodermic injections of morphine will check peristalsis and induce rest. Glucose solution should be given intravenously and subcutaneously. If the loss of blood is excessive, transfusions are indicated at once. When the hemorrhage has entirely ceased the patient should be treated medically for a few weeks. As soon as his physical condition returns to normal, surgical treatment should be instituted.

Pyloric obstruction indicates a narrowing of the outlet and retention of food in the stomach. This is purely mechanical and should be treated surgically to relieve the obstruction and permit proper emptying of the stomach.

The preoperative measures are important. Liquids should be given intravenously, subcutaneously and by rectum up to 4,000 c. c. daily. The stomach should be washed at frequent intervals. At least a week or ten days should be devoted to treatment by medical means before operation.

Perforation, once the diagnosis is made, is an indication for immediate operation. The longer the interval between the accident and its repair, the smaller the chance for recovery. It is dangerous to waste time in the effort to decide whether the perforation is gastric or duodenal, or is caused by some other pathologic condition in the upper abdomen, such as a ruptured gallbladder or acute pancreatitis. It is the perforation itself which demands correction, and its exact site can be determined when the abdomen is opened.

Malignancy, when determined or even suspected, also calls for operation at once. Treatment to prove whether a large gastric ulcer is benign or malignant is to be condemned. Gastric carcinoma is operable only in the early stage. Delay may allow metastases to occur and make successful removal of the growth impossible.

Coincident symptomatic cholecystitis or ap-

pendicitis may retard the healing of peptic ulcer and produce continuous clinical symptoms in spite of rigid medical management. In such cases relief can best be obtained by removal of the diseased gallbladder or appendix and surgical treatment of the ulcer. In our series of patients, 89.4 per cent had associated cholecystitis, appendicitis, or both.

Chart 8

Treatment	Number Patients	Per Cent
Medical	364	71
Surgical	151	29
Total	515	100

In *Chart VIII* it may be seen that of the total number of patients seen, 71 per cent were treated medically. The majority of the first group had early uncomplicated ulcers. The group treated surgically, 29 per cent, corresponds exactly to the number of patients with complications, also 29 per cent, as shown in *Chart VI*.

Follow-up letters were mailed to all patients with ulcer who were examined between 1920 and 1930. The results of this study are tabulated below.

Replies were received from 285 patients. Of these, 160 were from the number who received medical treatment and 125 from those who had operation. The questions asked and the replies received concerned only the symptoms complained of before treatment was begun. The results are classified as follows:

(1) Excellent (75-100 per cent relief)
(2) Good (50-75 per cent relief)
(3) Fair (25-50 per cent relief)
(4) Poor (0-25 per cent relief)

Many patients treated medically had not been seen since the original examination and many did not return the follow-up letter. The majority of the 160 who replied had made some effort to carry out a definite plan of treatment, with the following results:

Chart 9

	Number Patients	Per Cent
Excellent	90	56
Good	30	19
Fair	18	11
Poor	22	14
	160	100

An analysis of the entire group revealed that many patients practiced indiscretions in diet and failed to have foci of infection removed. This may account for the poor results. On the other hand, those who adhered strictly to the plan of treatment reported excellent or good results.

From the patients who had operation 125 replies were received. The results are shown in *Chart X*.

Chart 10

	Number Patients	Per Cent
Excellent	94	75
Good	20	16
Fair	6	5
Poor	5	4
	125	100

Those with peptic ulcer complicated by recurrent hemorrhage, obstruction, or perforation who were treated surgically were relieved of their symptoms in a sufficiently high percentage to justify the procedure.

A comparison of *Charts IX* and *X* indicates that a larger number of the surgical group obtained relief than of the medical group. There are perhaps several reasons for this. Patients who have gone through an operation are more impressed with the importance of following a strict diet. Their diseased tissue has either been removed by excision of the ulcer or relieved from irritating gastric secretions by gastro-enterostomy.

Peptic ulcer in the young, when symptoms are not severe, should be treated medically. Many patients will be permanently relieved. Others may continue to suffer and operation may become advisable. After operation medical measures should be carried out until the normal physiology of digestion is restored.

SUMMARY

(1) The symptoms of peptic ulcer have been recognized for nearly a century.

(2) Five hundred fifteen case records of peptic ulcer are reviewed, with special attention to etiology, symptomatology, and treatment.

(3) There seem to be two separate and distinct etiologic factors of ulcer. The first is the stimulus or irritation which starts the abrasion or ulceration; the second is the factor which causes the lesion to become chronic. It is believed that infective foci acting upon tissue with diminished blood supply produces a zone of lowered resistance. This is inflamed or abraded by irritating secretions and ulcer forms as a result.

(4) The fundamental principles of treatment are:

(a) Removal of the cause

(b) Healing or removal of the ulcer

(c) Restoration of the normal function of digestion

(5) The objects to attain in medical treatment are:

(a) Relief of pain

(b) Promotion of healing of the ulcer

(c) Relief of gastric spasm

(d) Reduction of acidity

(6) Surgery should be advised when medical management fails to give relief, and when complications arise, such as multiple or massive hemorrhage, pyloric obstruction, perforation, malignancy, and coincident symptomatic cholecystitis or appendicitis.

(7) Follow-up studies show that careful medical management of uncomplicated peptic ulcers gives gratifying results.

(8) Those patients who were operated upon obtained satisfactory end-results. A larger percentage of this group were relieved than of those who were treated by medical means.

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DISCUSSION (*Abstract*)

Dr. Frank D. Gorham, St. Louis, Mo.—If the autopsy findings are indicative of the incidence of ulcer, then it would seem that probably no more than one out of four or five who have at some time a peptic ulcer ever develop symptoms sufficiently serious to seek medical aid. This lack of symptomatology may be due partly to the peculiar sensibilities of certain individual groups.

The influence of seasonal changes upon ulcer symptomatology is well known. It would appear that the incidence of peptic ulcer is lower in a hot and higher in a cold climate. This graduation of increased incidence from hot to cold is suggested in a recent investigation by Apperly, of Australia, and a comparison of certain statistics of the United States, Central Europe and Denmark. Two questions arise: is the incidence of peptic ulcer higher in a cold climate, or does a cold climate influence the symptomatology of ulcer? The influence of mental stress as to exacerbation of ulcer symptoms and even demonstrable lesions appeared to be of equal importance to temperature and seasonal changes. Heredity seems to play at least a minor role.

From my observation, a high concentration of free hydrochloric acid in the stomach during the interdigestive period is nearly a constant finding of duodenal and prepyloric ulcer, and the nearer the ulcer is situated to the pylorus, duodenal or gastric side, the higher the gastric acidity. An ulcer in the stomach away from the pylorus, especially high in the lesser curvature, frequently shows a low amount or absence of free acid in the fasting contents or after a test meal.

Many dietary regimens have been recommended for peptic ulcer. These diets include almost every known food combination. There is one principle involved in these diet plans that seems to be outstanding and almost common for all, namely: the giving of small feedings of bland food of high caloric value at frequent intervals. The primitive food, milk, is the most common one used.

Frequent feedings of food call forth continuous gastric function, both secretory and motor. Alkalies in the stomach act similarly to food, that is, alkalies stimulate gastric function both secretory and motor. They also neutralize a certain amount of acid and some of them influence body chemistry. There are no conclusive experiments showing that alkalies, because of neutralization of the acid, aid in the healing of the ulcer. Alkalies relieve symptoms, but not in proportion to their alkalinity or acid-combining power. It is plausible to assume that hypersecretion of hydrochloric acid in the stomach is a compensatory reaction in peptic ulcer. Biologically speaking, the presence of hydrochloric acid in contact with the gastric and duodenal mucosa is a normal state. It is as reasonable to believe that an injury to the mucosa might produce a compensatory increase of secretion of gastric juice as to believe that the neutralization of hydrochloric acid, a normal constituent of the gastric juice, will prove beneficial in the healing of the ulcer.

It has been demonstrated that in peptic ulcer there occurs in the stomach and duodenum a state of hyperirritability, both secretory and motor, this being especially evident during the interdigestive period. In ulcer management, an attempt is made to control or counteract the effect of this secretory motor dysfunction by mental rest, diet, sedatives and antispasmodics. Sedatives and antispasmodics to their physiological limit are of special value in the treatment of peptic ulcer. They are of relatively greater value than alkalies.

Dr. Sanders (closing).—An enormous amount of experimental and clinical work has been done on peptic ulcer, but the results have not proven clearly the etiology of the ulcer. Mann's recent work on the effects of hydrochloric acid on the duodenum of dogs is convincing, but other factors, yet to be discovered, play a part in the production and chronicity of ulcer.

Our patients who had pyloroplasty with wide excision of the ulcer bearing tissue, who had their foci promptly removed, and who followed a careful postoperative medical regime, had strikingly good end-results.

A review of the records of 515 cases of peptic ulcer and personal communications from more than half this number convince me that patients with early uncomplicated peptic ulcer can be satisfactorily treated by medical means. Also, patients with long-standing symptoms who have obstruction, recurrent hemorrhage, or perforation obtain excellent results by combined surgical and medical treatment.

THE PREVENTION AND TREATMENT OF POSTOPERATIVE INTESTINAL INCOMPETENCE (PARALYTIC ILEUS)*

By LeRoy Downing Long, M.D.,
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We prefer the term intestinal incompetence to that of paralytic or adynamic ileus for the following reasons enumerated by my father, LeRoy Long, in an address before the Inter-State Post-Graduate Medical Assembly in 1924:

"Ileus is derived from a verb meaning to twist. It is not at all certain that twisting takes place very often in the condition usually called postoperative ileus. Adynamic ileus is a somewhat better term, because it expresses the lack of physical strength, but again there is no reason for believing that adynamia is necessarily or particularly associated with twisting. Postoperative obstruction is not a good term, because it emphasizes the importance of a mechanical barrier which is believed to be, relatively, of minor importance. Believing that the determining factor in the production of this postoperative catastrophe is incompetence of the intestinal musculature, the term 'postoperative intestinal incompetence' would appear to be an appropriate name, for the reason that it more distinctly indicates the state of affairs present."[1]

The pathology is great distention of the intestinal coils with an abnormal intra-intestinal pressure, due to the accumulation of gas, digestive juices and toxic products within the lumen of the bowel. There is free fluid, often blood-tinged, in the peritoneal cavity. The great thinning of the wall of the bowel, from pressure within, causes damage to the blood supply of the bowel wall, and if unrelieved there is resultant ischemia, which may go even to gangrene. There may or may not be peritonitis. The incompetence may or may not be associated with a mechanical obstruction. If there is obstruction, it is, in the average case, partial and relatively of minor importance after the reestablishment of the competence of the intestinal musculature.

In recent years considerable work has been done which tends to show that there is not an actual paralysis of the intestinal musculature, but that the lack of propulsive power in the gut is due to some nervous factor, probably excessive irritation or stimulation of the splanchnics. The splanchnics inhibit peristalsis. They are the depressor nerves of the intestinal tract, and are opposed to the pressor nerve, which is the cranial autonomic.

Alvarez has stated that strips of intestinal musculature removed from cases of "paralytic ileus" have retained their inherent qualities of contractility, irritability and rhythmicity. Arai[4] observed increased peristalsis in animals after the division of the splanchnic connections. He then produced peritonitis in these animals and noted that the increased peristalsis was not interfered with by the peritonitis. Meek, Ivey and Kelly[4] showed that depression, anorexia and vomiting in dogs, due to distention of a loop of gut, could not be reproduced in another group of dogs in whom the loops had been previously denervated.

Unquestionably, disturbance of chemical equilibrium from systemic losses of water, chlorides and bases, particularly from vomiting, is an important factor in the production of symptoms. Armour,[7] writing in the *British Journal of Surgery* in 1931, thinks that the loss of water and chlorides is always the cause of death, and that there is probably no true toxemia. This conclusion was based upon his ability to maintain dogs to which he supplied water and chlorides, whereas he lost the control dogs who did not receive water and chlorides.

The work of Bottin, in the clinic of Professor Debrez of Liege, is interesting in that he apparently was able to demonstrate the presence of acute pancreatitis in all animals in whom there had been an accumulation of gas and digestive juices (presumably toxic) in the duodenum. This work was done on dogs, and if interpreted literally would seem to show that all fatal cases of so-called paralytic ileus have acute pancreatitis.

Another factor which apparently enters into the production of symptoms is the "shock syndrome" effect, due to splanchnic engorgement and stasis, dehydration and most particularly from local loss of blood plasma into the gut, gut wall and peritoneal cavity.[4]

Toxemia is a rather late manifestation in all forms of obstruction except the strangulated type where there is early interference with the blood supply of the gut wall. Absorption of toxin must be either by the blood stream or through the gut wall. Very little toxin can be absorbed by the blood stream. In intestinal incompetence the ischemia of the gut wall occurs late and after long-continued intra-intestinal pressure. It is not until then that any appreciable amount of toxin can be absorbed.

*Read in Section on Surgery, Southern Medical Association, Twenty-Sixth Annual Meeting, Birmingham, Alabama, November 15-18, 1932.

Obviously, there are certain conditions, such as lesions of the central nervous system, profound toxic states, widespread peritonitis and complete mechanical obstruction, which sometimes make the prevention of intestinal incompetence impossible.[1] However, in the average risk abdominal operation, it is our belief that it can almost always be prevented.

Anything which interferes with the normal function of the intestinal musculature, or which tends to do so, may be a predisposing factor in the production of incompetence. Among these we may list:

(1) Preoperative debility from any cause.
(2) Preoperative purgation.
(3) General anesthesia.
(4) Trauma of surgical operation.
(5) Early postoperative feeding.
(6) Postoperative catharsis.
(7) Early or stimulating postoperative enemata.
(8) Neglect to furnish water, chlorides and carbohydrates.
(9) Neglect to keep the patient comfortable after operation.

In the effort to prevent incompetence we, therefore, attempt to avoid the predisposing causes just mentioned.

The preoperative improvement of the patient's general condition, where possible, is an obvious elementary requirement. A no less important requirement is the omission of preoperative purgation.

The anesthetic should be expertly given. It is said that general anesthesia predisposes to incompetence, while spinal anesthesia does not. Abstractly, that is probably true, but we believe that the importance of the statement depends very largely upon how well the anesthetic is given. One must consider, too, the very serious question of whether the temporary interference with splanchnic inhibition by spinal anesthesia outweighs in importance the profound upset of vascular tension.

Gentle handling, warm and moist protection of viscera, sharp dissection, asepsis and hemostasis are of tremendous preventive importance.

We wish particularly to emphasize the harm that may be done by unwise, incidental exploration in the presence of acute intra-abdominal disease.

It is our belief that ample morphine to keep the patient comfortable should be given for the first forty-eight hours. Despite the warnings which have been issued in recent years by various men in regard to the use of morphine after operation, we are of the opinion that it is a most valuable drug at this time. We do not hesitate to use enough to keep the patient comfortable, and we are unable to see any ill effects from such use. We are aware of the experimental work which has been done on dogs which seems to show that morphine produces increased intestinal tone and increased contractions. We are familiar with the statement of Dragstedt[4] that the "interpretation of the beneficial action of morphine in peritonitis must be on some other basis than that of abolishing intestinal activity and putting the intestine at rest." It is enough for us as clinicians to know that it does have a beneficial action.

The routine administration of cathartics after operation in the abdomen is a harmful practice.[2] For twenty-one years patients under our care have not received a preoperative or a postoperative cathartic. My own personal experience covers the past ten years, during which time we have not had a single instance of intestinal incompetence, except where peritonitis or mechanical obstruction or lesion of the central nervous system preceded the operation. That is to say that in the average risk abdominal patients there have been no cases of so-called paralytic ileus. In addition to this, these patients are comfortable. This happy experience we attribute largely to the absence of premature efforts to move the bowels by means of cathartics, stimulating enemata, pituitrin or like agents. The work done by Ochsner, Gage and Cutting[7] on dogs showed that pituitrin is ineffective and sometimes decreases, rather than increases, intestinal tone. They also showed that physostigmine is no more than mildly stimulating, and that its effect is not significant. The action of these drugs is capricious and uncertain. That pituitrin or physostigmine may not only be of no benefit, but may be harmful, is shown by the experience of several men who have seen rupture of the intestine after its administration.

Early feeding is undesirable and usually harmful. In our work, little or no food is allowed before the third or fourth postoperative day. The first effort to move the bowels is made by giving an enema of one pint of plain warm water on the fourth day. If unsuccessful, it is not repeated until the next day.

Ample chlorides and water are furnished before and after operation by mouth, proctoclysis, under the skin or in the vein. For several years we have not used any solution except normal saline in the rectal drip. We do not use retention enemata.

The frequent use of the colon tube, inserted just past the sphincter, is a simple but effective means, which is often overlooked, of assisting the patient to expel flatus.

The symptoms of postoperative intestinal incompetence are increasing abdominal discomfort with progressive distention, but often without any acute pain. There is obstipation and no flatus is passed. There is nausea which for a considerable time may not be followed by vomiting. The pulse rate is increased. The stethoscope reveals a still abdomen as contrasted with the audible vigorous, rhythmical peristalsis of mechanical obstruction. The x-ray is of considerable aid in differentiating incompetence from mechanical obstruction. Multiple fluid gas levels are characteristic of localized loop distention which is strongly indicative of mechanical obstruction.

The treatment of postoperative intestinal incompetence may be divided into four heads: (1) decompression of the upper intestinal tract to rid the gut of gas and toxic substances; (2) provide physiologic rest for the intestinal tract; (3) supply ample water, chlorides and carbohydrates; (4) steps which are directed toward the assistance of the intestinal musculature in its return to competency, that is, the ability to carry on normal propulsive movement. The steps outlined under this last heading are not immediately necessary, but are to await the good results obtained by decompression, physiologic rest and administration of chlorides and water.

(1) *Decompression.*—Decompression is best obtained by continuous nasal catheter drainage (the Levin tube). Intermittent gastric lavage is obsolete. Continuous nasal catheter drainage, which I understand was recommended by Dr. Matas, is, I believe, as does Harvey, one of the most important contributions to postoperative treatment of abdominal cases made in the past ten years. We have used it for the past six years with increasing satisfaction. It usually decompresses the upper intestinal tract in a very satisfactory manner, and since employing it we have found the necessity for enterostomy markedly reduced. We use the catheter with siphonage alone into a pan on the floor, or with the water suction siphonage recommended by Wangensteen.[5] The latter apparatus permits the measurement of both gas and liquid return, and the gentle suction allows more effective decompression. The tube remains in the stomach for days, or as long as necessary. A few hours after being placed in the stomach the amount of dirty material in the return may be almost unbelievable. The decompression suction and lavage is continued as long as necessary, after which the tube is tentatively clamped while the patient is allowed to take liquids by mouth. It is sometimes necessary to try this several times before the final removal of the tube.

If decompression with the nasal catheter is unsuccessful, an enterostomy is indicated.

(2) *Physiologic Rest.*—Physiologic rest for the intestinal tract is obtained by the use of adequate amounts of morphine (particularly during the first forty-eight hours), avoidance of early feeding, no cathartics or stimulating enemata and the positive forbiddance of pituitrin and physostigmine, which supposedly stimulate the vagus.

(3) *Chlorides and Water.*—Ample water and chlorides are supplied through the Levin tube, intravenously, by the rectal drip, or under the skin. Carbohydrates are given as glucose intravenously.

(4) Some measures which have been suggested as being of assistance in restoring competence are: hypertonic intravenous solutions, splanchnic anesthesia and heat.

Hypertonic sodium chloride given intravenously seems to have a beneficial effect in restoring competence. Gosset,[7] in dogs, found that hypertonic saline, 20 per cent, given intravenously stimulated peristalsis. There have been various explanations as to the mode of action when hypertonic saline is given intravenously. Gosset has mentioned the production of diuresis, and says that water and toxic products are drawn from the tissues to the blood, and that peristalsis is stimulated. Others have followed Haden, who spoke of chloride as a detoxicating agent.

It is apparent that some of these men are not familiar with Gamble's work, who showed that the so-called toxic effects of intestinal obstruction are due to a disturbance of the acid base equilibrium owing to loss of chlorides and water, particularly from vomiting, and that the best means of restoring this equilibrium is by the administration of concentrated salt intravenously and normal salt under the skin.[7]

It is probable, although some disagree, that there is no specific action on peristalsis from hypertonic sodium chloride, but rather that obtained by any markedly hypertonic solution, such as glucose for example. It has been my personal observation that hypertonic glucose is

just as effective in stimulating peristalsis as is hypertonic sodium chloride.

Other measures which may assist the intestinal tract in the resumption of its propulsive movement are those which are directed towards cutting off splanchnic inhibition, such as spinal anesthesia or paravertebral anesthesia. I have used spinal anesthesia on several occasions for this purpose, but have not been particularly impressed with the results obtained. Theoretically, it would seem to offer help.

The application of heat, as with an electric pad or with enormous hot packs to the abdomen, is of benefit.

Since we have been successful in the prevention of incompetence in the average risk operative cases, our experience in treatment has been restricted to patients seen in consultation, and to those patients of our own who had peritonitis or actual mechanical obstruction before operation. Nevertheless, because of our interest in the prevention and treatment of intestinal incompetence, we have, through the kindness of our surgical friends, had considerable experience in the treatment of this distressing condition. It is evident, therefore, that incompetence is still a common problem. For this reason, it seems to us that the presentation of this plan for preventing intestinal incompetence is justifiable. This plan has stood the test of time, and we know that, through its application, lives are saved.

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DISCUSSION (*Abstract*)

Dr. Rudolph Matas, New Orleans, La.—I must demur in the acceptance of the term "intestinal incompetence" as a substitute for the classical "paralytic ileus." Neither term covers the complex pathology of the disorder of the gastro-intestinal functions which long-established custom has characterized as "paralytic ileus." Not one cause but several no doubt enter into the etiology of this phenomenon. The most important cause, apart from the operative act, resides in the preoperative constitution of the individual, who may be predisposed to the disturbance of intestinal function that is designated as ileus, or incompetence, as Dr. Long prefers to call it. Some of the factors that enter into the polyvalent etiology of this condition are well recognized, but others remain obscure and require further elucidation.

Fortunately, and despite the conflict of theories, great progress has been made in the treatment of this condition. By providing constant gastro-duodenal drainage by nasal intubation, the fate of these patients has been enormously improved and their comfort assured as never before in the history of abdominal surgery. Enterostomy in its modern simplified technic provides an outlet for the retained toxic intestinal contents, and is every day saving many lives that in the past would have been doomed without it. The continued intravenous drip of saline or glucose solutions provides against dehydration, while sustaining the cardiovascular tonus, dilutes the toxins of the blood and stimulates urinary elimination. Injection of appropriate solutions corrects the unbalanced chloride level of the blood, which in some cases appears to be the dominant disturbing factor.

Apart from these new therapeutic agencies, improvements are constantly being made in methods of anesthesia and in the technics of gastro-intestinal surgery, which even in the last decade have profoundly modified the surgeon's attitude towards postoperative complications, and enormously improved the outlook of the abdominal patient.

RENAL TRAUMA*

By CHARLES M. SIMPSON, A.M., M.D., F.A.C.S., Temple, Tex.

Renal trauma may be chronic or acute. Chronic trauma is so vague and varied that any proper evaluation of it is extremely unsatisfactory and difficult. Acute trauma is much more definite and of much greater interest, both from a surgical and an industrial standpoint. Injuries due to sudden trauma are generally rather infrequent, though most surgeons will have to deal with at least two or three in the course of an average practice. Kuster found ten cases in 7,740 autopsies. Judd, in 1917, reported ten cases seen in the Mayo Clinic up until that time. There were nine cases seen at the Scott and White Hospital during the twelve-year period from 1918 to 1930.

Renal injuries, with external or open wounds, are exceptionally rare, even in military reports, and the pathology is usually complicated by injuries other than those of the kidney alone. The United States Surgeon's Office (Keyes) reports only 129 such injuries among 170,481 battle casualties in the late World War, and statistics show a similar paucity in other wars. Treatment is very much the same as for any other lac-

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erated wound, the chief considerations being the control of hemorrhage and infection.

Injuries without external wounds are the type most frequently encountered, and these are likewise relatively rare, inasmuch as the kidney is usually well protected by the ribs, vertebrae and heavy muscles. In women, the flaring crest of the ilium also acts as an added protective factor. In spite of this heavy protection, however, it is particularly noteworthy that apparently the most trivial injury may cause rupture of the kidney, the disastrous result frequently being out of all proportion to the force of the injury. The trauma may be of two more or less distinct types. Direct violence is that occasioned by blows or kicks immediately over the body of the kidney. Indirect violence may be roughly divided into two kinds: the one resulting from sudden force or blows, striking distant parts of the body; the other, due to heavy lifting, straining or exertion. Of the nine cases here reported, seven suffered violence of the direct type and two of the indirect type, one of these latter while lifting a baby, and the other while playing basket ball. Spontaneous rupture occasionally occurs, there being approximately 30 cases reported in the literature. These, however, have all occurred in association with some pre-existing renal disease. There were none in our series.

The pathology present following such injuries depends primarily upon the location and extent of the lesion. Tuffier's classification has long been widely accepted by most authors. It is as follows: (a) ecchymosis; (b) subcapsular rupture; and (c) total rupture. The question here arises, however, as to whether or not this covers the ground completely. The problem of renal mobility or nephroptosis is practically never discussed in conjunction with injuries to the kidney, yet there is no treatise on this subject that does not mention trauma as one of the etiological factors in renal dystopia. A study of 375 cases of nephroptosis seen during a ten-year period at the Scott and White Clinic revealed that twenty-four, or 6.4 per cent, gave a history of acute trauma as the direct cause of the symptoms of the condition. Many authors are of the fixed opinion that trauma has been the cause of symptoms only in an organ already movable. Harris states that movable kidney never occurs as a result of single trauma except in cases of predisposing body type. Mathe believes that severe injuries are seldom followed by movable kidney and states that as a matter of fact the kidneys are more firmly fixed than ever after severe trauma. Albarran and Herrick are of the same opinion. Others, such as Sulzer and Kelly and Burnam, are convinced that a number of patients do develop movable kidney as a result of trauma, but nearly all are agreed that a large majority of these cases have the peculiarly disposing cylindrical body form described by Wolkow and Delitzen.

In this connection, Kidd has recently made an interesting contribution to the subject by placing movable kidney in what he calls a branch of the surgery of sprains. He states that sudden trauma can either rupture or stretch the upper portion of the fibrous bands or ligaments which suspend the upper pole of the kidney from the perinephritic fascia, or that it can rupture the two layers of the peritoneum where they fuse below the kidney and leave this space open like the space around the ureter. In either case, the sudden trauma would produce a condition where the kidney would become free to move a much greater distance. Even in such cases, however, there would be in the majority of instances some predisposing or congenital weakness which would make such an occurrence possible. This whole subject would thus seem to assume very much the same aspect as the problem of inguinal hernia and probably will be finally settled on a more or less similar basis.

Next in degree of severity to dislocation and tears of the fatty capsule without injury of the kidney proper are contusions of the renal parenchyma resulting in mild hemorrhages or ecchymoses of Tuffier. The more severe lesions involve an actual tear of the parenchyma and the capsule, with possibly some perirenal extravasation. The next degree involves not only a tear of the parenchyma and capsule, but of the pelvis and vessels of the hilum, adding urinary extravasation to the usually rather profuse hemorrhage. The most severe type of lesion consists not only of severe, complete rupture of the kidney, but also of the renal pedicle and laceration of the peritoneum. This latter gives the most profound shock and massive hemorrhage.

The exact mechanism involved in rupture is somewhat a matter of speculation, but Kuster's hypothesis is the one usually accepted. This is that hydraulic pressure, acting through the full vessels and pelvis of the kidney, causes the organ to burst along the lines radiating from the hilum toward the point of maximum impact against the ribs, the opposing resistance being supplied by the vertebral column.

The symptoms of injury to the kidney are usually very definite, but vary considerably in degree, being not at all dependent upon the

cause of the injury or the extent of the damage done. Shock is generally considered to be a very fair index of physical injury, but many very severe cases of renal trauma show relatively little shock. Immediate shock, with nausea or vomiting, is primarily due to the accident causing the injury, while the remote or delayed shock is practically always due to persistent hemorrhage.

Hemorrhage, which is always present to a slight degree, except possibly in true dislocations, is of very slight import in the less severe cases. It is, however, of very serious import in the severe lesions and especially in those where the peritoneum is torn. If the renal vessels be completely ruptured, the hemorrhage is frequently fatal, and especially is this true if the peritoneum likewise be torn; however, when the surrounding tissues remain intact, the tumor formed by the hematoma may exert enough pressure to bring about clotting and control of the hemorrhage. Hematoma, which is complicated by urinary extravasation, usually provides a very fertile field for infection. Abscess formation is a frequent complication in these cases. In our own series, incision and drainage was necessary on two occasions.

Hematuria is probably the most frequent diagnostic symptom. It occurs generally in 90 to 95 per cent of all cases of renal injuries and was present in all but one of our cases in this series. Its absence may be due to anuria from shock or suppression, injury to the outer capsule only, a clot blocking the ureter, or, most serious of all, to a complete tear of the ureter. Hematuria may be and usually is immediate, but in some cases it may be delayed for as much as two weeks, as happened in one of our cases. Careful catheterization and irrigation of the bladder, or even cystostomy, may be necessary in some cases to determine the true source of the hemorrhage.

Pain is likewise a frequent finding in kidney rupture and is often very severe. Its intensity, however, is subject to extreme variation, some of the most severe cases showing very little discomfort. This is due to the fact that the kidney proper has nerves only in the pelvis and pedicle, and becomes painful only on torsion and increased pelvic pressure. Thus, blocking of the ureter with clots or injury to the surrounding structure is necessary for the production of severe pain. A certain amount of soreness or tenderness is practically always present, no matter how slight the lesion. This is accompanied many times by a very marked rigidity and spasm. Tenderness over the kidney involved was present in all our cases of ruptured kidney, and in all but two of the twenty-four cases of renal dystopia.

The chief complications of injuries are due to hemorrhage and the extravasation of urine, both of which furnish fertile soil for infection. This infection may be fulminating, as in other cases of urinary extravasation, but this is unusually rare; more often, abscess formation results and incision and drainage become necessary. Traumatic hydronephrosis also results as either the true type depending upon a movable kidney with a fixed ureter, or the psuedotype due to organization of a cavity connected with the pelvis. Pyelonephrosis or chronic pyelonephritis may result in some cases.

The treatment of renal injury is determined in a large part by the amount of shock, hemorrhage and infection. There are three methods of handling such cases: (a) expectant treatment; (b) conservative surgery; (c) radical surgery or nephrectomy. In general, it may be said that the milder degrees of injury, that is, those short of rupture of the renal pelvis and pedicle, practically all tend to recover spontaneously under expectant treatment. This treatment consists of rest in bed, sedatives, ice caps, coagulants, forced fluids, and urinary antiseptics. This method of handling should, in fact, be carried out in the majority of cases for a number of hours in order to determine the character and extent of the lesion and combat any shock, if present. Only the desperate cases with rupture of the renal pedicle and peritoneal tear should be subjected to immediate surgery and then, only after all supportive measures, especially transfusions, have been employed.

Expectant treatment, however, should be abandoned for surgery when there is a continued hemorrhage, as evidenced by a steadily rising pulse or an enlarging hematoma, when the anemia becomes pronounced, when anuria sets in, or when positive evidences of infection appear. In most instances, conservative surgery consists of suture of the ruptured kidney or incision and drainage. Where, however, there has been severe rupture of the renal pedicle, multiple lacerations, deep tears in the pelvis, or severe infection, radical surgery or nephrectomy will be necessary. Spontaneous rupture, being always associated with some other renal pathology, practically always necessitates nephrectomy. In our own series, five cases were handled expectantly, two conservatively and two had nephrectomies.

The results of treatment are somewhat controversial, owing to the varied opinions among

surgeons and the relatively few cases reported in the literature. Watson, in 1903, reported a mortality of 27 per cent with expectant treatment, 8.5 per cent with conservative treatment, and 22.5 per cent with nephrectomy. Reise, in the same year, reported a mortality of 21 per cent with expectant treatment, 12 per cent with conservative treatment, and 18 per cent with nephrectomy. Ponomareff, in 1914, reported 114 cases treated expectantly, with a mortality of only 9 per cent. Fortunately in our own series there was no mortality. In general, it may be said that where doubt exists, it is best to resort to operation as the outlook for the severe and questionable cases is not good under expectant treatment.

The manner in which these injury cases are handled has a bearing not only upon the prognosis in the individual case, but also upon his relation to society. Insurance and workmen's compensation play a large and increasingly important part in all injuries. This has been brought out by Wesson, who remarks in this connection that the insurance carriers want the man back at work as soon as possible, preferably with two kidneys, and at a minimum expense. If he has a nephrectomy, he either gets well quickly and without complication, or he dies; if he is treated expectantly, he is usually much longer in recovering and very frequently complains of pain, a subjective symptom, the presence or absence of which cannot be demonstrated, and he may become as expensive as the old-time "railroad spine" case. Wesson further states that a careful, detailed study of the literature furnishes not one authentic case of pain in an uninfected, healed kidney. There are, however, many cases handled expectantly where real complications do result and these do have definite claims upon the insurance companies and their employers. Notable among this class are the increasing numbers who ascribe their nephroptoses to some definite trauma.

The industrial accident boards, as well as the insurance companies in general, seem somewhat indefinite in their handling of cases of renal trauma. They have had, as a rule, few cases and have handled practically all of them largely on the basis of nephrectomy. Wesson states that the state industrial accident commissions, whose ratings are practically all based on obsolete data, usually rate nephrectomy as from 40 to 50 per cent total disability. In California, the commission considers the loss of a kidney equal to the loss of an eye, and rates it at 20 per cent, or eighty weeks' compensation. The Texas Industrial Accident Board does not even attempt to make any rating on this disability. The United States Veterans' Bureau rates nephrectomy, no matter for what done, at 40 per cent disability. The thirty-nine largest insurance companies belonging to the Actuarial Society of America have, in the last year, revised their ratings, which are briefly as follows: nephrectomy, for any condition other than tuberculosis or tumor, postponed for two years, then accepted with an extra premium and 25 per cent extra mortality until ten years have elapsed, when they are accepted as standard.

Further study of the industrial aspect of this subject should be carried on in the future, inasmuch as a more thorough understanding of all the factors, both medical and social, will materially aid the surgeon in the handling of these often difficult and trying cases.

The following are the case reports:

Case 1 (52830).—L. L., a boy of eighteen, was admitted December 6, 1925. Three weeks previously, while playing football, he had been struck in the right side. He took time out for a few minutes and then resumed play until the end of the game when, walking off the field, he fainted. He did not pass any urine until the following morning, when he voided about eight ounces of practically pure blood. This gradually cleared up over a week's time, during which he was up and about, but very tender in the right loin. Then, about ten days ago, and again about two days before admission, he had a profuse hemorrhage, which was still present when he entered the clinic. Examination showed slight tenderness in the region of the right kidney. Cystoscopy was done on December 7, 1925, which showed fair function with a little hemorrhage from the right side. Pyelogram showed a greatly distorted right pelvis. On December 11, the patient had a severe hemorrhage into the bladder and eight ounces of blood clot were removed; this occurred again on the following day, when ten ounces of blood clot were removed. The patient was given two transfusions and on December 14 a right loin incision was made under local anesthesia.

On opening the perineal capsule, such profuse hemorrhage was encountered that it was necessary to pack the wound without further procedure. These packs were all removed by December 26, but on December 27 the patient again had a sudden, severe secondary hemorrhage, which required immediate repacking. He was given several more transfusions and on January 13, 1926, a secondary operation was done. The approach was made through a right rectus incision and a large, hemorrhagic mass was encountered in the kidney region. On opening into this mass, profuse hemorrhage again occurred, but the renal vessels were caught and the kidney, which was found to be ruptured into two separate halves, was removed. Following this, the patient had two more transfusions, bringing the total number given up to thirteen. He had an uneventful convalescence and when seen last, August 26, 1932, he was in excellent health.

Case 2 (54082).—M. K., a boy of sixteen, was admitted to the clinic on April 20, 1926. Two hours be-

fore entrance the patient was playing leap-frog at school when he missed his leap and fell to the ground, striking the point of the right elbow against the loin. He had immediate pain through the right loin, which persisted until admission, and was soon accompanied by nausea and vomiting. He passed urine thirty minutes after the accident and it was filled with a fair quantity of blood. The patient tried to walk, but was unable to do so because of pain in the side. Examination revealed rather marked tenderness in the right loin, with considerable spasm and a suggestion of a tumor. Catheterized specimen of urine was full of blood. X-ray of the genito-urinary tract was negative.

The patient was arranged for immediate operation, at which time a right loin incision was made. On opening into the perirenal fat, about one pint of free blood and clot was encountered. The kidney was widely ruptured, beginning at the pelvis, extending toward the cortex, involving approximately two-thirds of the diameter of the kidney. The pedicle was clamped and the kidney removed. The patient had an uneventful convalescence and is at present playing basket ball very actively.

Case 3 (28344).—Mrs. A. H., a married woman, aged 34, was admitted to the clinic April 23, 1918. Twenty-four hours before entrance the patient stooped over to pick up her baby and was struck by a sudden, intense pain in the right upper quadrant. This pain was continuous and steady and relieved only by opiates. She vomited immediately and had vomited five or six times since. She had had slight fever and her local physician found a tender, rounded tumor mass about the size of an orange in the upper quadrant. She had voided three times since the onset, but did not report noticing any blood in the urine. Urinalysis on the day of admission showed the urine to be clear, with a heavy trace of albumin, only an occasional pus and no red blood cells.

The patient was arranged for operation April 23, at which time a right loin exploration was done. A large hematoma was found surrounding the right kidney, which was drained and the wound packed. It was necessary to repack the wound on two occasions, but her convalescence was otherwise uneventful and the patient was dismissed on May 30, 1918. At that time she still showed a slight trace of albumin. The patient has not reported since.

Case 4 (38192).—P. E. H., a boy, aged seven, was admitted on May 27, 1921. Two days before admission the patient was riding a bicycle and fell on the right side, striking a large rock embedded in the ground. He went home complaining of severe pain in the right side and loin. The following morning he passed a fair amount of blood in the urine, which gradually cleared up on successive voidings. The patient had slight temperature the morning of examination and vomited once. Examination showed some tenderness in the right loin, with a slight rigidity of the right rectus muscle, and two or three discolored areas on the side of the abdomen. X-ray of the genito-urinary tract was negative. The white blood count was 21,650, with 81 per cent polymorphonuclear leucocytes. The patient was placed in bed on expectant treatment and the urine gradually cleared until at the time of dismissal on June 1, 1921, there was only a faint trace of albumin and an occasional red blood cell. The patient has not reported since.

Case 5 (75100).—C. M., a boy of ten, was brought to the clinic January 4, 1930. Five hours before admission the boy was running up steps, when his foot slipped and he fell, striking on the right side and rolling down two or three steps. He arose, walked up the stairs and went to bed with a severe pain in the right side. A few minutes later he voided, the first part of the urine being practically pure, bright red blood. On admission he had marked tenderness and rigidity in the region of the right loin. The urine showed Grade I red blood cells, with occasional pus cells, and a faint trace of albumin. X-rays of the chest and genito-urinary tract were negative. Blood count showed 21,200 white blood cells, with 95 per cent polymorphonuclear leucocytes.

He was placed to bed on expectant treatment and the following day showed 24,000 white blood cells and 88 per cent polymorphonuclear leucocytes. This gradually subsided until January 11, when he had 8,250 white blood cells and 67 per cent polymorphonuclear leucocytes. The blood in the urine increased slightly to Grade III by January 7 and then disappeared. Pus cells persisted, however, and increased to Grade III by the time of dismissal from the hospital on January 11. He ran a slight temperature at first, but this gradually subsided. At the time of dismissal on January 11 he was improving rapidly. A report from the patient on October 3, 1932, stated that he had recovered completely and had had no further symptoms.

Case 6 (12216).—P. G., a man, aged thirty, was admitted on June 25, 1929. Twenty-four hours before admission the patient slipped and fell into the manhole on the tank of an engine tender. He fell in such a manner as to strike his left side as he went through the hole. He soon after began suffering with severe pain in the left chest on deep inspiration and noticed that he had blood in the urine. Examination showed that he had a few rales in the left chest on deep inspiration, with slight tenderness and rigidity of the abdominal muscles in the left kidney region, both anteriorly and posteriorly. On admission urinalysis showed many red blood cells with marked albumin. The urine gradually cleared of blood, as evidenced by twenty-six examinations, being entirely free by August 10.

Cystoscopy done on July 15 showed considerable blood from the left side and a slight obstruction 4 cm. up the left ureter. Cystoscopy was reported on July 18 and again on July 24, at which time a catheter was passed easily to the left pelvis and a pyelogram was done. Function of both kidneys was found at that time to be normal and the pyelogram negative. The patient was dismissed on August 24, 1929, apparently fully recovered. He has not reported since.

Case 7 (42537).—B. C. M., a man, aged thirty, came to the clinic November 22, 1922. He stated that three days before admission he was kicked by a horse, the hoof striking the lateral aspect of the right abdomen about the lower rib border. The patient was knocked down, but did not become unconscious and was able to walk to his home. About one hour after the accident he passed bloody urine. This continued for about two days and then cleared up. He was nauseated and vomited several times during the first twenty-four hours, but had no nausea afterward. His temperature was 101.8 the day before admission. He had considerable abdominal distention, with tenderness and fullness in the right upper quadrant. Examination showed this distention to be quite marked, with rigidity and ten-

derness over the entire loin and flank. There was no discoloration or other evidences of trauma. Urinalysis on admission showed a few red blood cells, with a trace of albumin.

He was arranged for operation on November 23, at which time a right loin exploration was done. Opening down on the kidney, there was found to be a large blood clot encapsulated in the kidney posteriorly. The capsule was opened and the clot removed. Oozing was controlled by packs and the wound drained. Packs were removed on November 27 and the patient continued to an uneventful convalescence. He again reported on January 27, 1927, at which time he was in excellent general condition and the wound causing no further trouble.

Case 8 (56078).—Mrs. C. M., a married woman, aged thirty-six, was brought to the clinic on June 19, 1929. Eighteen hours before admission the patient had been struck over the left loin by a baseball. She suffered very marked pain and shock at the time, but did not lose consciousness. About one hour later she passed urine which was very bloody. She had voided three times since, passing blood each time. She had been slightly nauseated and vomited several times since the accident. Examination showed considerable spasm over the left lumbar region, with a slight fullness in this area, but no definite mass could be palpated. There was a large, bluish discolored area, about 10 to 12 cm. in diameter, over the lateral aspect of the left abdomen. The urine on admission was red and cloudy, showing Grade IV red blood cells and a slight trace of albumin. The patient was placed in bed on expectant treatment, under which the blood gradually cleared until she had three negative urine examinations at the time of dismissal on July 5, 1929. The patient has recently been heard from, having had no further symptoms from the urinary tract.

Case 9 (60727).—O. W., a single man of eighteen, reported to the clinic on August 29, 1927. He stated that six months before admission, while playing basket ball, he jumped and felt a severe strain in the region of the left kidney. This was accompanied by a sharp pain posteriorly, extending upward from the kidney region toward the shoulder. Two weeks later he noticed blood in the urine and this had been present almost continuously since. At first there were several clots, but these had practically disappeared, although the urine still remained rather bright red. Examination showed no enlargement, tenderness nor spasm in the left kidney region. Urinalysis showed a trace of albumin, with Grade IV red blood cells and occasional pus cells.

Cystoscopy on August 30, 1927, showed bloody jets from the left ureteral orifice. There was a residual urine of 13 c. c. on this side. Pyelogram showed a dilated ureter with hydronephrosis. The patient was advised to have expectant treatment, but was not hospitalized.

He reported on October 8, 1932, at which time he stated that the bleeding had persisted for some eight to ten months following his examination here, and that there was a suggestion of recurrence of bleeding two months before the report, but that this was not definite.

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DISCUSSION (*Abstract*)

Dr. Edward T. Newell, Chattanooga, Tenn.—Dr. Simpson has called attention to the fact that often a serious kidney lesion is overlooked, and also to the fact that the treatment of serious kidney involvement, so-called "fracture of the kidney" is not always the same.

I recall a case of a boy who had a blow over the left kidney in an automobile accident. The symptoms of kidney involvement did not manifest themselves for nearly twenty-four hours, the other multiple injuries in this case claiming the attention of both the surgeon and the patient. When blood was detected in the urine and a mass found in the left loin, operation was considered. The patient was in a very serious condition, so we decided to delay operative interference as there was no fresh hemorrhage discernible. The hemorrhage gradually disappeared, the mass resolved, and the patient made a perfect recovery without operation.

On the other hand I can recall several cases in which we were forced to operate by reason of the fact that the patient continued to bleed at intervals and would have bled to death, had not prompt operative interference been instituted with the removal of the kidney.

There may be instances where suture of the kidney is justifiable, but it is my opinion that where a kidney is badly damaged and the other kidney is functioning properly, it is better to remove the injured kidney.

I want to emphasize the point that it is easy to overlook a serious injury of the kidney at first examination, if the patient has multiple injuries.

Dr. G. V. Brindley, Temple, Tex.—An apparently trivial injury may produce extensive damage out of all proportion to the degree of injury. This fact is well illustrated by the case of the boy who, while playing leap-frog, fell on his elbow and sustained a rupture of his kidney, such that it became necessary to remove it. By remembering this first fact, error in diagnosis may be prevented and proper and prompt treatment for a patient with severe renal damage may be instituted.

Another fact to which I would call attention is that

the kidney has the power of repair to an unusual degree. We know that a kidney can be resected and that the conserved portion will maintain satisfactory function. In keeping with this knowledge, frequently kidneys with rather extensive laceration can be saved by proper suture and drainage.

Dr. Simpson (closing).—There are two points which I wish particularly to emphasize. One is that the statistics on renal trauma are comparatively few and somewhat confusing, and that the treatment will finally be determined, in a large part, by the judgment and experience of the surgeon who is handling the case. The other is the need for further study by the medical profession of the effects of nephrectomy in general, so that more definite data may be at hand for their guidance, and also, that they may be able to help the insurance companies better and more accurately to evaluate the expectancy of life following this operation.

CHRONIC PSEUDOMEMBRANOUS TRIGONITIS*

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The condition to which I wish to call attention is one which has received little or no consideration from the urological profession. It is my feeling that its occurrence is much more common than has been reported and if for no other reason, its resistance to any and all forms of treatment would merit a discussion at this time.

In a search of the literature dating from the last half of the Eighteenth Century the condition is described less than a dozen times. It was not until 1909, when Rosenow described a case of membranous cystitis and demonstrated the presence of pseudodiphtheria bacilli in company with colon bacilli, that any light was thrown on the etiology of the condition.

Townsend, at a later date, reported a most exhaustive investigation of the organisms which infect the genito-urinary tract with particular reference to the pseudodiphtheria group. He also reported a case of cystitis with membrane formation showing a pure culture of pseudodiphtheria bacilli. The case reported by Curtis likewise showed a pure culture of this particular group of organisms.

Later, in 1917, Nelken and Langford described a case which they also termed membranous cystitis, and they gave a detailed bacteriological study corroborating Rosenow's finding of the pseudodiphtheria bacillus. This organism was not, however, a constant finding in all of their bacteriological studies.

The fact that this bacillus was found in all the above mentioned cases in pure culture or associated with other bacteria would tend to indicate the pathogenicity of the organism and its peculiar predilection for the trigone of the bladder.

This peculiar affection of the bladder was given the more applicable name of pseudomembranous trigonitis by Ryall in 1929. He presented an excellent clinical description of the condition and stated that it was not an uncommon finding among the infections of the female bladder in particular. No mention was made, however, of any bacteriological findings other than the colon bacillus. He differentiated his description from the true membrane formation oftentimes seen in the declining stages of chronic cystitis and also from a pseudomembranous condition of the posterior urethra and bladder neck in which the parts are seen to be very much swollen and to bleed readily.

Of the 5 cases reported all were adults, 2 being males and 3 females. In none of the patients had there been any history of previous genito-urinary infection or instrumentation of the bladder or urethra. The physical examination of each patient revealed no foci of infection and in all cases the urine was alkaline.

It is of interest to know that the mode of onset was somewhat different in different cases. Rosenow reported that his patient was seized with a sudden attack of chills and fever with frequent, painful and bloody urination. Two other cases had a more gradual onset, one applying for treatment one year after the onset of the first symptoms. Nelken's patient gave a history of two months of terminal hematuria without distress before he was seen, and during the course of his infection, which extended over a period of years, recourse to suprapubic cystostomy was made on two different occasions in an effort to relieve the intense suffering. This patient I have been able to locate and in a recent communication it is learned that he is now at the head of a large business, is married with children, and is enjoying good health. A bacteriological study of his urine was made during the present month by Dr. Langford, of Touro Infirmary, and no pseudodiphtheria organisms could be demonstrated either by smear or culture. The urine did contain *B. coli,* staphylococci and considerable pus.

*Read in Section on Urology, Southern Medical Association, Twenty-Sixth Annual Meeting, Birmingham, Alabama, November 15-18, 1932.

In my patient the first symptoms were those of a typical acute cystitis with frequency, urgency and tenesmus without chills or elevation of temperature. There was at times some slight terminal bleeding, but this symptom has not been so common as in the other cases. The most outstanding symptom was described as being a pain deep in the bladder of a most aggravated type associated with frequency and marked tenesmus.

Her history is most interesting and is representative of the trials and sufferings which these patients undergo. The various diagnoses and suggestions as to treatment of her perplexing condition are most interesting and illustrate the wide difference of opinion among some of our foremost urologists, a principle reason in prompting me to discuss this condition.

Her history is as follows:

Mrs. W., a well developed white woman of 55, was first seen in December, 1929, complaining of marked pain and frequency of urination. Her past health up to the onset of the present trouble was excellent. She was the mother of 4 grown children. There was no history of genito-urinary infections previous to the present illness. There had been no operations or instrumentation of the urinary tract.

The present history dated back six years when the family physician was first consulted because of an acute onset of burning, frequency and urgency of urination. After many bladder irrigations the symptoms subsided. A few months later, while in a large Eastern city, the symptoms returned and a very thorough examination was made in a well known clinic. No diagnosis was made other than acute cystitis and relief was again obtained by local measures.

These troublesome bladder symptoms would recur in from a few weeks to a few months and as the patient traveled considerably the best institutions in the larger cities were consulted. Everything possible was done during this time to eradicate all foci of infection. Various dietary measures were followed as well as all local forms of treatment directed toward the kidneys and bladder. The attacks varied in length from a few days to several weeks and occurred in different sections of the country, at varying altitudes and during any season of the year. Nothing seemed to alter the periodic appearance or intensity of the condition.

The patient consulted me two and one-half years ago during a severe attack of burning and frequency of urination. The general physical examination was negative. There was no kidney tenderness or pain upon pressure above the pubes. The urine contained quantities of blood, pus and motile rod-shaped bacilli. Sedatives and mild bladder irrigations were given frequently until the acute symptoms had subsided and the urine cleared considerably. Following an injection of cocaine solution into the urethra a small cystoscope was introduced into the bladder. The bladder mucosa was seen to be intensely red and edematous with the blood vessels greatly enlarged and tortuous. Covering practically the entire trigone and extending well down into the vesical outlet was seen a pearly-white membrane with irregular margins which in some areas seemed quite thickened and in others quite thin and translucent. When touched with an ureteral catheter the edge of the membrane could be torn with some resulting bleeding. After several weeks of daily bladder irrigations of mild silver nitrate solution, followed by the instillation of various drugs and solutions, the bladder was again examined with the cystoscope and the membrane had almost entirely disappeared. In a short time, however, all the symptoms returned in an even more exaggerated form. The membrane was noted as before and at this examination both ureters were catheterized and cultures taken from each kidney, both of which proved to be negative. In desperation various solutions of potassium permanganate, potassium cyanide, dilute acetic acid, silver nitrate and mercuric chloride were used with little or no benefit. At times it was necessary to keep the bladder partly filled with neothesin in order that relief might be afforded. Codeine by mouth and rectal suppositories of opium were often used as an adjunct when local measures failed. All of the so-called urinary antiseptics were administered by mouth with no results other than gastric disturbances.

During the quiescent periods the urethra was thoroughly investigated, and dilatation with sounds was carried out until size 30 F. could be passed with ease. The ureters were repeatedly catheterized; the cultures were repeatedly negative except in an occasional instance when colon bacilli were obtained.

For quite long periods of time the patient remained free of symptoms and the urine was clear. The longest period of relief was for eight months preceding a visit to the East in the early summer of last year. Soon after arriving, however, she was siezed with a severe attack and was seen by a prominent urologist who unhesitatingly made a diagnosis of leucoplakia of the bladder and advised open operation and curettement of the suspected area. This was refused, and when she was examined a few days later in a large medical center the membrane had all but disappeared and the diagnosis of leucoplakia was not verified. This occurrence proves the changing appearance of the bladder which was characteristic of this case.

At the present time the patient is still having periodic recurrences of her difficulty. I have lately been acting on the suggestion of Ryalls and am using silver nitrate in strong solution on swabs applied directly to the trigone through the urethroscope as well as solutions of silver nitrate alternating with acetic acid as bladder irrigations. A very superficial fulguration of the trigone has been given which I plan to repeat at intervals. Diphtheria antitoxin has not been used because of the poor results obtained in Nelken's case. The patient has been placed on a strict ketogenic diet with the urine kept highly acid in the hope that the large numbers of ketone bodies may free the bladder of infecting bacteria. The question of allergy has been considered, but as yet no effort to desensitize the patient to the infecting organism has been made.

Despite all these measures that have been suggested and put in practice the patient is still confined a large part of the time because of the distressing symptoms which recur at varying intervals and intensity. The most thorough bacteriological studies during the past year have failed to demonstrate the pseudodiphtheria bacillus. Five different laboratories have cooperated most kindly in attempting to work out this problem, but to date none of the members of the diphtheroid group have been demonstrated. Only the colon group

has been reported. Specimens of this patient's urine were sent to Dr. Langford, who did the bacteriological work on Nelken's patient, and he likewise reported only colon bacilli. I feel that it is possible that the pseudodiphtheria bacillus has been present at times, as Nelkens stated that the bacteria were quite inconstant in appearance.

Through the darkness of this discouraging condition there can be seen a ray of hope in that the severity and frequency of the attacks are becoming less than in the past. Perhaps as time goes on a cure will be effected by the process of attenuation of the infecting organisms for the host.

DISCUSSION (*Abstract*)

Dr. Thomas D. Moore, Memphis, Tenn.—The chronicity of this disease and its severity approach those of urinary tuberculosis and advanced panmural fibrosis. In addition to leukoplakia these two conditions might well be considered in the differential diagnosis. Tuberculosis can readily be excluded by the negative results of the several laboratory procedures usually employed in establishing the identity of this type of infection. In chronic pseudomembranous trigonitis the renal specimens are free of pus, as a rule, whereas in urinary tuberculosis a unilateral or bilateral pyuria usually is found. Pyelography, either intravenous or retrograde, will be of further value in excluding tuberculosis.

The urinalysis in panmural fibrosis is likely to be essentially negative and the bladder capacity is limited. On cystoscopic examination no membrane is found, but rather the characteristic signs of the disease brought out by vesical overdistention.

More difficulty may be experienced in differentiating the disease from leukoplakia. In addition to cultural studies of the urine for the pseudodiphtheria bacillus, a biopsy will be of value, as the membrane is more of the nature of an exudate, there will be more evidence of an inflammatory process in the submucosa, and hyperplasia and metaplasia of the mucosa will be present in a lesser degree.

Regarding urine cultures, it has been my experience that little is to be learned by this unless special cultural methods are employed, with due regard for the oxygen tension and the hydrogen ion concentration of the culture medium. For example, how often have such bacteria as staphylococci and streptococci been found in large numbers in direct smears of the urine sediment, although a culture of the same specimen, using ordinary culture media, will reveal no trace of the organisms, but only a luxuriant growth of *B. coli?*

I have recently had under observation two patients who had the symptoms and findings characteristic of pseudomembranous trigonitis. Both were women in the early thirties. In each instance the trigone was markedly injected and there were irregular areas of a thin, greyish membrane, resembling wet tissue paper. In neither was there any evidence of renal infection. One of these patients has been benefitted, at least temporarily, by a series of topical applications of strong solution of silver nitrate. In the other case, the lesions so closely resembled leukoplakia that specimens were taken for biopsy and immediately the involved areas in the trigone were subjected to a light, but thorough, electrocoagulation. The prompt relief she experienced was both surprising and satisfactory, as a few days of increased irritation and vesical tenesmus had been anticipated. It is probable that electrocoagulation constitutes the chief weapon in combating this disease. It is certainly more effective than any type of chemical cauterization.

Dr. Orr (closing).—Dr. Montague Boyd suggested this morning that possibly an exposure of x-ray during the acute stage of the condition might be of some value. This I shall keep in mind and use in the future.

THE EFFECT OF BENCE-JONES EXCRETION ON THE KIDNEYS: A PRELIMINARY REPORT*

By WILEY D. FORBUS, M.D.,
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*and
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SUMMARY

The effect of excretion of Bence-Jones protein upon the human kidney has been studied in a series of four cases of multiple myeloma. It is felt that the study of this material furnished adequate support for the following statements:

(1) The excretion of large quantities of Bence-Jones protein by the kidney over a period of months results first in a toxic injury to the tubular epithelium and secondly in an obstruction of the kidney tubules by precipitated protein. These protein plugs or casts reach such a size as to cause great distention of the tubules, and occasionally they may cause the rupture of the tubule.

(2) The precipitation of the protein with its subsequent changes in character produces a mechanically destructive effect upon the tubular epithelium, leading to its desquamation and disintegration.

(3) The precipitated Bence-Jones protein behaves in the manner of a foreign body in the tissues and becomes the object of attack by the usual protective forces of the body. The reaction stimulated by this foreign body is similar in all respects to that produced by any solid foreign body introduced into the tissues from

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*From the Department of Pathology and the Department of Biochemistry, Duke University School of Medicine.

without. This reaction is characterized by the following features:

(a) The invasion of the interstitial tissue and the tubules by wandering cells of both polymorphonuclear leucocytic and mononuclear phagocytic types, the latter predominating.

(b) The formation of large multinucleated syncytial cell masses about the hyaline protein plug.

(c) The partial or complete removal of the foreign body, the protein plug, by phagocytic activity of the wandering cell.

(4) The tubular epithelium which desquamates from time to time plays little, if any, part in the formation of the syncytial cell masses about the hyaline protein plugs and is most probably in no way concerned with the phagocytosis of the precipitated protein.

(5) The reaction called forth by the precipitation of the Bence-Jones protein in the tubules is identical with that stimulated by the desquamation and disintegration of the tubular epithelium in mercury poisoning.

In a series of animal experiments the effects of Bence-Jones excretion on the kidney have been studied. Rabbits and dogs were employed. The introduction of the protein, purified and in salt solution, into the peritoneal cavity is followed immediately by a condition of shock accompanied by vomiting, refusal of food, and general discomfort, and within a few hours by the appearance of Bence-Jones protein in the animal's urine. Continuous excretion of the protein was maintained for twenty-five days in a dog and a rabbit and for a period of nineteen days in three rabbits. Lesions similar to those in the human kidney were produced in the kidneys of these animals, but the extent of the involvement was found quite insignificant as compared with that in the human kidneys. The details of the experiments, which are still in progress, are not ready for publication, but the data in hand seem to indicate that a serious toxic effect is produced by the protein on the kidneys.

DISCUSSION (*Abstract*)

Dr. George S. Graham, Birmingham, Ala.—As Dr. Forbus has pointed out, the task that he has set himself is surrounded by many difficulties. First of these is the unknown nature of the Bence-Jones protein and the uncertainty as to the mechanism of its production in the body. The whole problem of the protein balance of the blood and tissues is still somewhat uncertain, even when we consider only the relatively simple bodies classed as albumin and globulin, their total relative amounts and the influences that change them. Finally, the whole question of the mechanism of renal excretion is involved. Facing such difficulties it is not to be wondered at that Dr. Forbus should be modest in his claims of exact findings.

The lesions that he demonstrates are highly interesting. The tubular plugs, much larger than the common hyaline casts, the apparent lamination and the peculiar refractility all would seem to indicate that he is dealing with a special type of intratubular deposit. More convincing still is the foreign body giant cell reaction about these intratubular bodies. The epithelial degenerative changes are also peculiar, especially in respect to their striking focal disperse distribution.

Since knowing that I should discuss this paper I have re-examined the kidney from a case of myeloma observed a few years ago. It shows the peculiar focal degenerative change in the tubular epithelium described by Dr. Forbus. While it was noted in the microscopic study made at the time, its significance was not then appreciated.

It has been claimed and by others denied that the continued excretion of Bence-Jones protein may produce severe renal insufficiency. In a paper published three years ago Bannick and Greene suggested that its presence in the urine and often at the same time in the blood may characterize a certain group of cases in which profuse albuminuria and low phenolsulphonephthalein output are associated with severe anemia, the picture not fitting in with the findings typical of chronic nephritis.

I should like to ask Dr. Forbus whether he gets any lesions of the liver or of the bone marrow in his animals.

Dr. Forbus (closing).—I do not think that there is anything further to add except a word of explanation of our attitude toward the question of the origin of the giant cells and the mononuclear phagocytic cells which are conspicuous in the Bence-Jones protein lesion in the human kidney. It is our feeling that everything points to the conclusion that these cells are entirely unrelated to the kidney epithelium. We regard them as merely different and perhaps somewhat peculiar forms of the usual mononuclear phagocyte (monocyte, clasmatocyte, reticulo-endothelial cells, plasma cells or whatever one may choose to call them). These cells wander from the interstitial tissues into the lumen of the damaged tubule and there begin their phagocytic activity. As this proceeds the cells may change their form, thus giving rise to the giant cells and other strange forms which are numerous. That there are giant cells within the tubules that arise from the proliferation of tubular epithelium which retains its vitality is not questioned since they are obvious. But these cells have nothing to do with the phagocytosis of the tubular debris as far as we can see. They are, however, engaged in carrying on their natural purpose of reestablishing the epithelial lining of the tubule which they seem to be quite capable of accomplishing, even though bizarre cell forms and cell masses appear as the result of the extraordinary conditions under which these cells must grow and reproduce themselves. In answer to Dr. Graham's question, I may say that none of our animals showed lesions elsewhere than in the kidney. All animals were studied by complete autopsy.

OBSTETRICAL COMPLICATIONS TREATED IN THE HOME BY THE GENERAL PRACTITIONER*

HYPEREMESIS GRAVIDARUM, ECLAMPSIA, POSTPARTUM HEMORRHAGE

By JOSEPH E. GREEN, M.D.,
Laurel, Miss.

Permit me to say in the beginning that I am fully aware that volumes have been written on any one of the three above mentioned obstetrical complications. During eighteen months' service in a 100-bed charity hospital, where I was in charge of the obstetrical wards, over 500 women were delivered. Twenty-two per cent were complicated cases, many of them of the more serious types. I was impressed with the large number of physicians who in referring the cases seemed to have lost their equilibrium and were ready to throw up their hands and holler murder when there was not a man in sight.

I shall not be able to bring to you any new facts. Many times in our mad rush for new thoughts to supplant the old, our patients suffer. Taking this into consideration, I am going to review some of the old treatments of pernicious vomiting of pregnancy, eclampsia and postpartum hemorrhage, and I hope to add some of the newer treatments that have been proven to be worth while.

Until four years ago my work was that of the small town and country doctor. Therefore, when I was asked to read a paper before you, my first thought was to select a subject that might be of some help to those outstanding obstetricians, the country doctors. I am speaking of you boys who made that call on Dry Branch or Silver Run on a cold, bleak night in your faithful T-model Henry, and after many long hours of watchful waiting at the bedside realized that you must intervene to save the life of a suffering mother. The lights were not good, for the splinters were poor, or the brass lamp had gone on a strike. There were no trained nurses to help, no consultant, no trained anesthetist, and no sterile packs or instruments. However, these slight hindrances were soon overcome. Your instruments were boiled in the dish pan and when you called for soap to wash your hands, you were told in the most apologetic manner that "The soap is just out, but we had intended sending to town tomorrow to get some. Would gold dust do?" You answered, "Sure, gold dust will do just as well." Your hands were cleansed in gold dust water, but to make the sterilization more complete you passed them through a solution of lysol which was always carried in your obstetrical bag for such emergencies.

After putting your patient to sleep, the chloroform was turned over to some kind neighbors to continue the anesthetic, but they, being afraid, would not hold it close enough to the patient's nose to keep her asleep, and it was necessary for you to watch the anesthetic as well as the delivery.

Not long ago I read a statement from a noted obstetrician which, as I recall, was as follows:

"No woman should ever be delivered by a general practitioner, for he is not fitted either by training or temperament to deliver her. They should all be delivered by a specialist in a hospital."

The physician who made that statement is regarded as one of the leading obstetricians of the East, and when I read and reread it, like the old owl, I was forced to say, "Who would have thought it?" To me that statement was too ridiculous even to be funny. One of the most unfortunate situations that we are facing today is that young physicians go straight from the hospital where they served their internship to a medical center, specialize and are often placed on the staff of a postgraduate school as soon as they hang out their shingles as specialists. Then when one of us comes from the small towns (where he is forced to be specialist in all lines) to the postgraduate school seeking more light and further knowledge, he fails to receive it because there is no light. It is true that our American maternal and infant mortality is entirely too high, but if it is ever reduced, more help must be given the men who, after all, deliver most of the babies; and they are, as we know, the general practitioners.

Pernicious Vomiting.—The cause of pernicious vomiting we do not know, although possibly every gland in the body, both ductless and those with ducts, has at some time been referred to as being the possible cause of hyperemesis. So let us dismiss the etiological factors by saying that we do not know, but sincerely hope that some time soon those of our profession who are giving their lives to research work will find out the cause.

To treat successfully a case of pernicious vomiting, there are a few prerequisites. The accoucheur should know at least the general rules of the mechanism of labor. By this I

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mean he should be able to see to his own satisfaction just what is taking place in the woman's body in that great struggle of life or death. To accomplish this he should gain all the knowledge he can by studying the bony pelvis and by doing some postgraduate work every year if possible, continuing his efforts until he believes he can do the work as well as anyone else under similar circumstances. Finally, he should be able to sell himself to his patient and her relatives; he should know he can do the work and make his patient believe he can carry her through if any physician can.

Active treatment consists of rest, and by rest we mean absolute rest in bed. The mental attitude of the patient should be watched and carefully guarded. This can usually be accomplished by isolating the patient in the quietest room in the house and going about our work in a knowing manner, assuring the patient that we shall be able to care for her, encouraging her by saying that no doubt forty or fifty years hence she will be happy that she suffered that she might give to America such a brilliant leader as her son may be. If there has been fussing from an inappreciative husband, call him aside for a heart-to-heart talk and try to change his words of rebuke into words of love and sympathy. If there has been a crowd of knowing midwives and long-tongued neighbors giving advice, bar the door against them. Extreme cases may arise in which it becomes necessary to place a strong "no admittance" card on the door.

Next, we must supply food and fluid to nourish the body and water the dehydrated tissues, which can be done in several ways. Keep the patient flat of her back and give only dry food, a very small portion at a time, but at short intervals. Give no fluids except after small amounts of dry food, and then only a small amount at a time until she begins to retain some food and fluids. It may be necessary to give her glucose in the vein or 1,000 c. c. of 5 per cent glucose by hypodermoclysis. Finally, we can resort to proctoclysis, and here again I use 5 per cent glucose in normal saline. The first and last of these treatments can be used in the home. The physician can give the infusion and any woman with common sense can be taught to give a proctoclysis. If these fail, wash out the stomach. It is not always necessary to have a stomach pump. Just put one teaspoonful of cooking soda in a pint of water and have the patient drink one glassful of it. If it comes back, and as a rule it will, give the second glass, and the third if necessary; often you will be rewarded by having the third glass stay down. If all these fail, you may resort to drugs, almost all of which have at one time or another been hailed as specific for nausea and vomiting in pregnancy, but soon discarded and forgotten. (a) The sodium salt of phenobarbital has been very satisfactory in my hands; give two grains thirty minutes before meals; if the patient vomits it, resort to hypodermics. (b) Daily injections of 1 c. c. of corpus luteum have been a big help to me in many cases, although I know many of you will differ with me about this preparation.

During the last twenty years this has been my routine treatment in the home, and only twice during that time have I found it necessary to empty the uterus. I cannot close this discussion without a word of warning: that to wait one day too long to empty the uterus may mean the loss of your patient; and if the time comes when you are afraid to back your judgment, do not wait. Call another doctor.

Eclampsia.—Possibly no obstetrical complication gives the accoucheur more concern than eclampsia. In eclampsia, just as in pernicious vomiting, it is quite necessary that the physician keep a cool head, refuse to be excited by the frightened relatives, and go about the job in a systematic manner so that the very atmosphere assures people that all is well, for Dr. A is here and he knows what to do. Immediately inject intravenously 20 c. c. of a 10 per cent solution of magnesium sulphate, but inject very slowly, watching your patient closely for occasionally you may kill one very quickly. Some of our best men say that magnesium sulphate is harmless, but I know better, for I sent a woman to heaven, and it seemed to me that she was gone at least an hour, although only a few seconds passed, while I was changing from magnesium sulphate to calcium chloride. As soon as I began injecting calcium she again breathed. Inject ¼ to ½ grain of morphine; I prefer the half grain doses; and repeat the magnesium every hour until convulsions are controlled. For elimination, give from 30 grains to one teaspoonful of calomel. I usually let my conscience be my guide and have no conscience. Follow this with a big dose of salts. If the patient will not swallow it, get it in through stomach or nasal tubes, repeating every two hours until free elimination is obtained. Further elimination is obtained by putting the patient in a hot pack. After consciousness is regained, draw from the vein 300 to 600 c. c. of blood and replace it with

twice the amount of 10 per cent glucose in normal saline. Give fluids by mouth, by hypodermoclysis, or by Murphy drip. Keep the patient very quiet by placing her in isolation if possible, and here again it may be necessary to put a sign on the door. The diet is skimmed milk for two days, and if the patient continues to improve, gradually add fruit juices and vegetable liquors. No meats or eggs are given. Phenobarbital has been most satisfactory in my hands in controlling convulsions, after they have been checked with magnesium sulphate. If for any reason you cannot give magnesium sulphate intravenously, sodium amytal in the vein works well, but the blood pressure should be checked at short intervals. If the pulse remains rapid, that old remedy, tincture of veratrum viride, serves well. The patient's pulse should be watched closely, and when it comes down to 72 per minute, discontinue veratrum. I think it is seldom necessary to use this drug and personally I do not give it unless I have a good trained nurse on the job.

During the last few years the treatment as outlined has been my routine for all eclamptics. I never attempt an immediate delivery. If I am thoroughly convinced that the baby is dead, then simple induction methods are used. I do not believe any eclamptic woman should be subjected to cesarean section except in case of contracted pelvis or other complications where a delivery is impossible through the normal route. I know that many sections are successfully done, both mother and baby surviving; and if that were the end of the story, well and good, but it is not always that way. If you will observe closely and check the records you will find that it is the poorer classes around our medical centers who have most sections in eclampsia; and after they are well (if they get well) they drift out into the small town or country, and in due course of time the old family physician is called for a second delivery. Finding a large, roomy pelvis, he lets the patient go into labor. In a few hours she goes into shock and dies from a ruptured uterus. The question I should like for you to carry home with you and ponder well is this, "Who was responsible for that woman's death if anybody was?" Was it the man at the hospital who did a section on the woman who could have been delivered through the normal route, or was it the man back in a country village who took a chance because he had no modern conveniences at his command? I have known of two such patients during the past year, one of whom died. The other survived after a very stormy journey.

Postpartum hemorrhage, like the complications just discussed, demands immediate and active treatment or else it is forever too late. I think it would be folly to enter into a lengthy discussion of the symptoms of postpartum hemorrhage when they can be summed up in a few words. "Doctor, everything is getting dark, I can't see. I am so weak. Somebody please bring me a glass of water. Doctor, do something for me; I'm dying." The patient is very pale, pulse rapid, and with but little volume, and she is in a cold, clammy sweat. It is not necessary for one to go further than this to know what this is, and quick action is demanded. Grasp the uterus and if it is not contracted, make firm pressure, holding it between thumb and fingers; elevate the foot of the bed; give ergotamine and pituitrin by hypodermic. The uterus should be packed tightly, but if you are not going to do anything more than stick a piece of gauze in the vagina, it is better not to do anything. There is one other emergency method that I was forced to employ many years ago in a desperate effort to save a life. Since that time I have used it in about 8 cases, and each time the results were spectacular. With a long hypodermic needle, draw 1 c. c. of pituitrin into the syringe. Grasp the uterus, pulling it up against the abdominal wall, which is best accomplished by digging down with the fingers of the left hand well under the uterus. Lift it up and hold tight. Go straight through the abdominal wall and inject pituitrin into the fundus of the uterus. In less than one-half minute you will feel that soft sponge converted into a hard, firm mass. This will check the hemorrhage; then we must get busy with our fluids, which can be given in one of four ways: infusions, intraperitoneally, by hypodermoclysis, and by Murphy drip. We may be so situated that we cannot resort to any of the first three methods, but the last can be employed in all cases.

In conclusion, permit me to say that I have refrained from mentioning the advantages of hospitalization. We all know that wherever possible, it is sane and sensible to hospitalize the patient. But during my eighteen months in Charity Hospital, where there were over 500 deliveries, I was impressed with the large number of cases that were rushed there for treatment. With the exception of one case of eclampsia in which the surgeon wanted to do a cesarean section, and did, we have had no maternal deaths. Cesarean sections on many other patients were

advised, but refused. The older I grow the more I am convinced that too often the most important indications for sections in cases such as I have outlined are: (1) the young, ambitious surgeon wants to do a section; and (2) some of our efficient surgeons see a big fee and more favorable comment from the public because Dr. A took the baby out through the side and both mother and baby lived.

DISCUSSION (*Abstract*)

Dr. Thomas Benton Sellers, New Orleans, La.—I agree with Dr. Green that we do not know the cause of pernicious vomiting of pregnancy, but during the past ten years there has been a decided advance in the management of the condition. The newer methods of treatment, including the institution of early treatment in all cases of vomiting of pregnancy, the use of the duodenal tube, at times for seven to fourteen days consecutively, and the administration of glucose and insulin, together with the older accepted lines of treatment which Dr. Green has mentioned in detail, have proven highly effective in my experience. During the past ten years, I have not found it necessary to induce labor in a single patient whom I have had under my own observation from the beginning of the nausea. The work of Dr. Luikart and Dr. Plass on the possible significance of vitamin B in the prevention and treatment of polyneuritis of pregnancy, which occasionally complicates pernicious vomiting of pregnancy, I hope will prove of inestimable value in handling this group of cases.

Dr. Green has covered the subject of the management of active eclampsia. My method varies somewhat from his, and I do not agree with him as to the rationale of the large doses of calomel. In cases of active convulsions, it is of the utmost importance that a nurse or a physician be in constant attendance. The foot of the bed should be elevated in order to prevent the patient from aspirating the vomitus. If the pelvic measurements are within normal limits, I suggest the induction of labor in all cases by rupturing the membrane as soon as active convulsions are under control and the patient has recovered from her state of shock. Otherwise, I suggest a low cervical cesarean section under local anesthesia.

Postpartum hemorrhage should be a rare obstetrical complication. The most common causes of the condition, according to my judgment, are (1) attempt at manual dilatation of the cervix, (2) attempt to effect manual delivery before the cervix is completely obliterated, and (3) haste in delivering the placenta (normal expulsion may require from ten minutes to one and a half hours). After the placenta is delivered, I routinely use pituitrin, and if the uterus does not contract within a reasonable time, I use one of the ergot preparations hypodermically. Dr. Green suggests the injection of 1 c. c. of pituitrin directly through the abdominal wall into the uterine wall. This I cannot discuss, as I have had no experience with it and feel somewhat loath to try it in spite of Dr. Green's excellent results. I also routinely inspect the cervix after all deliveries, and especially after abnormal deliveries.

THE SOUTHERN WHITE CLINIC CHILD: A STUDY OF 500 CASES WITH SPECIAL REFERENCE TO DIARRHEA AND OTITIS MEDIA*

By JOSEPH YAMPOLSKY, M.D.,**
Atlanta, Ga.

This study was undertaken primarily because an opportunity presented itself to review a number of consecutive cases in a typical large Southern city clinic where only white children were admitted and where through a thorough follow-up it could be determined whether these patients were actually clinic type cases or not. These cases may all be grouped under the term malnutrition, as there were few patients who came for medical advice with the knowledge that there was nothing physically wrong with them. Let us first define the term, malnutrition. The average physician uses the term loosely and seems to have the same idea of the malnourished child as of the undernourished one. Emerson says:

"Malnutrition is a clinical entity with characteristic history, definite symptoms, and pathological physical signs. The malnourished child is a sick child. In the child's history it is found that malnutrition results from physical defects or acute illness, or comes on as a consequence of overfatigue or faulty habits in regard to food or health."

Certainly undernourished children should be classified as malnourished, but underweight is only one of the causes of malnutrition. We have divided the 500 clinic cases of this study in three groups according to age. The first group consists of children from birth to one year of age; the second group from one to two years of age; and the third group from two to six years of age. This was done arbitrarily in order to differentiate the group that is still breast fed from the group that is fed on artificial food exclusively during the second year of life, and from the older children who are fed on a general diet, which consists usually of the food consumed by the rest of the family. So few children over six years of age were admitted that we did not think it worth while to classify them separately. There were 248 children in Group 1, 82 in Group 2, and 170 in Group 3. Contrary to the belief of most writers that children from two to six years are woefully neglected and

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**From the Central Presbyterian Clinic for Children.

not kept under the supervision of physicians, we see that there were more children in Group 3 than in Group 2. It might be interesting to note that 243 children of the whole group belonged to families who had only one child, 57 were found in families of two children, and in the group of families that had several children, 15 mothers had three children and all others had 6 or more in the family. Has the size of the family anything to do with the child's health and care? That is a most difficult question to answer. We see that nearly one-half of the children admitted to the clinic were in one-child families. The great majority belonged to the group under one year of age. Certainly it is to be expected that greater care will be given to children in that group.

AGE OF CHILDREN TREATED

Group 1, birth to 1 year	248
Group 2, 1 year to 2 years	82
Group 3, 2 years and over	158

NUMBER OF CHILDREN IN EACH FAMILY

Group 1, one child	243
Group 2, two children	57
Group 3, several children	200

In Group 3 there were 15 families with 3 children. All others had six or more.

Seventy-six children of all those examined were found to be normal, but only 15 were admitted to the clinic on that account after coming as healthy children to receive advice as to proper care and diet. The rest of the patients were apparently thought to be not well patients. Under the first group we find 41, or 14 per cent, of well children; in the second group, from one to two years of age, 10, or 12 per cent, were healthy, and in the last group we find 25 normal patients, or 14 per cent of the whole group. Apparently other factors are involved and a large family in itself does not mean an unhealthy family.

We realized that, although we were dealing with a class of mothers who came from a lower stratum of society than is to be found in private practice, most of the mismanagement in the first group could be attributed to the fact that mothers who have the first child are usually untrained in the care of babies and are unable to deal with children. That is the primary cause for digestive and other disturbances in the child during its first year of life. This condition has more bearing upon the change of the child's diet during the first year of life and will be taken up later.

While it is understood that about one-third of all children suffering from malnutrition are usually underweight, our figures show that a greater percentage of the clinic children in the South are underweight than is normally found. We find that among 248 children, the first group of 122, or nearly 50 per cent, were underweight. In the second group of 82, 56, or over 66 per cent, were underweight, and in the third group of 170, 92, or about 55 per cent, were underweight. These figures are given with consideration of the fact that 76 children, or about 17 per cent, of all children examined in the clinic were normal, and for that reason they may or may not be considered a part of this study. Only one child in the whole group was overweight and came to be treated for this condition.

Weaning.—In studying the problem of weaning of young children we were able to obtain correct information in only 101 cases. It is interesting to note that very few children are given complementary feedings. This seems to be done only in the upper stratum of society, where other engagements keep the mother away, and the two or three o'clock bottle is the most commonly asked for by the young mother. We have classified these cases under two groups: (1) the partially weaned, or those in whom breast feeding is supplemented with artificial food; and (2) the completely weaned, in whom breast feeding is abandoned. Among 41 cases in the first group, 23 babies were weaned from birth to two months of age, there were 14 children from two to six months of age, and only 4 children over six months of age.

It is surprising to see the causes for the institution of supplementary feeding.

Table 1

AGE OF PARTIAL WEANING, CAUSE, AND FOOD USED

Age of Children Partially Weaned	
Birth to 2 months	23
Two months to six months	14
Over 6 months	4
Cause of Supplementing Breast	
Hunger of child	3
Child not well or poorly nourished	21
Eczema	1
Ignorance of mother	12
Mother working	2
Mother probably had tuberculosis	1
No cause	2
Supplementary Food	
Eagle brand	7
Recolac	10
Cow's milk	5
Eagle brand and cow's milk	2
Eagle brand and dryco	1
Eagle brand and other food	1
Cow's milk, sugar and wet nurse	1
Cow's milk and recolac	1
Cow's milk and other food	1
Lactic acid and karo	1
Lactic acid	1
Malted milk	1
Condensed milk	1
Irregular breast feeding	1
Everything	1

Ignorance plays a great part in adding supplementary feedings, as 12, or 30 per cent, of the babies were partially weaned on account of ignorance. Other causes are about equally divided. Very few clinic children are apparently fed on cow's milk, which is supposed to be the best substitute for mother's milk. Only 5 mothers added cow's milk to the breast feeding and others added mostly canned foods, with condensed milk and recolac topping the list. The ease with which these canned foods are prepared and the ignorance of the mother certainly play a great part in the use of artificial foods of that nature.

COMPLETELY WEANED INFANTS

In the second group, consisting of the completely weaned children, we have followed up 60 cases. Twenty-nine of the cases were completely weaned from birth to two months, 22 children were weaned between two and six months, and nine after six months. Complete weaning or complementary feeding would be expected in this group because many of our clinic mothers were laborers. It is surprising to see how small a number of children were completely weaned for that reason. Only 7 children were weaned because their mother had to earn a livelihood. Ignorance again plays the greatest part in this series. Fourteen children, or 24 per cent, were weaned on account of ignorance. The next important cause is failure to gain, and these babies can also be placed under the group of ignorant mothers, because they were taken off the breast without consulting anyone who could give them proper advice. In changing the feeding from breast to artificial food, we find that only 6, or 10 per cent, of the whole group were placed on cow's milk. Ten children were placed on cow's milk and other foods and the greatest portion on condensed milk in one form or another. One child had a varied diet of whiskey, sugar and Eagle brand, defying the eighteenth amendment shortly after birth.

DIARRHEA AND ARTIFICIAL FEEDING

While we are interested in taking up the subject of diarrhea later, we want to show here, briefly, the old story of the part artificial feeding plays in disturbance of the digestive apparatus of the young infant.

Out of 141 breast fed babies only 18 developed diarrhea.

Of 82 cases where artificial feeding was added to the breast feeding, 54, or more than one-half, developed diarrhea in one form or another. In 13 cases where artificial food was used alone, 7 patients developed diarrhea and 6 did not. It seems that a combination of breast and artificial food is the most harmful, as the child has to accustom itself to the use of both at the same time. It might be wise completely to wean the child, since this possibly taxes its digestion less than forcing it to take two kinds of food at the same time. Years ago our problem in the South was one of educating the poor to wean their children at the proper time. Now it seems that most poor children are weaned from the breast early in life and naturally are weaned from the bottle much earlier. We saw only

Table 2

COMPLETELY WEANED CHILDREN

Age	
Birth to 2 months	29
Two months to 6 months	22
Over 6 months	9
Cause of Weaning	
Mother working	7
Diarrhea	2
Not enough food	4
Ignorance of mother	14
No cause	3
Rickets	1
Crying	2
Pylorospasm	1
Convulsions	1
Constipation	1
Was not doing well	1
Indigestion	2
Mother dead	2
Failure to gain	12
Colic	1
Mother had epilepsy	1
Eczema	2
Adopted baby	2
Sickly	1
Food	
Cow's milk, diluted	6
Cow's milk, straight	1
Cow's milk and eagle brand	6
Cow's milk, recolac and lactic acid	1
Cow's milk, eagle brand and recolac	1
Cow's milk and wet nurse	1
Mellin's food	2
Lactic acid	2
Lactic acid and recolac	1
Lactic acid and karo	2
Eagle brand	17
Eagle brand and dryco	4
Eagle brand and recolac	1
Dryco	4
Dryco, eagle brand and Mellin's food	1
Recolac	2
Various foods	1
Whiskey, sugar and eagle brand	1
Buttermilk	3
Recolac and wet nurse	1
Horlick's	1
Anything	1

Table 3

Completely breast fed, with diarrhea	18
Completely breast fed, without diarrhea	113
Breast fed with other foods, with diarrhea	28
Breast fed with other foods, without diarrhea	38
Completely weaned, with diarrhea	7
Completely weaned, without diarrhea	6

one baby which received the bottle at nineteen months of age, and of the normally fed breast cases the majority were weaned at about one year of age or earlier. Only one child was breast fed for twenty-four months.

DISEASES

Among the complaints and different diseases from which our patients suffered, certain conditions completely overshadow others. The diagnoses on first admission are shown in *Table 4*.

The number of diarrheas, both infectious and fermentative, predominates in the first year of life, there being 58. Ten children were suffering from this condition in the second year of life and six were in the last group. Rickets was also more predominant in the first group, there being 26 cases. There were 3 cases of rickets in the second year and 7 in the third group.

There were 12 cases of tonsillitis in the first group, 10 in the second and 50 in the third group. Apparently this disease increased with age, as it is so predominant that patients are brought in for this condition later in life. Underweight was not a chief symptom on admission. This condition usually came along linked with a picture which might be termed malnutrition. More cases in the third group have underweight as the chief symptom, since many patients in this group are sent in from school with a diagnosis of underweight. There were 15 cases in the third group, 5 in the second group, and 9 in the first group. Later, as these patients came to the clinic, we saw a different picture. Improper feeding was a cause for which a great number of children came to the clinic. The majority, or 55 of these, naturally came from the first group; 15 belonged to the second group, and 8 to the third.

These cases were studied consecutively. They are not selected cases. Very few patients came for advice as to preventive medicine, and yet many normal children were found in the group. There were altogether 76 children in whom the final diagnosis was of a negative nature. Many of these cases were brought by mothers who brought other sick children. They were examined merely in order to keep a record of them in the clinic.

Syphilis might be expected to be fairly prevalent in a group of patients of this character. From our statistics in other clinics we expected to find between 5 and 8 per cent of syphilitic patients. Of the 500 patients examined, there were only four patients suffering from congenital lues, or 0.8 per cent, which is exceedingly low, especially since Wassermann tests were taken on the slightest suspicion in all cases.

Eczema, a disease supposed to be more common among white than colored children, was found mostly in the first year of life. There were only 8 cases in this period, and one other case was found in the second year. That would tend to prove that eczema cases heal spontaneously and that sooner or later the system will conquer the disease by its power of natural resistance to causative allergic factors.

Scurvy seems to be a most uncommon disease

Table 4

	Group 1	Group 2	Group 3
Normal children	41	10	25
Diarrhea	58	10	6
Otitis media	57	21	19
Improper feeding	55	15	8
Tonsillitis	12	10	50
Rickets	26	3	7
Eczema	8	1	
Syphilis	1 N. S.		3
Impetigo	10	2	6
Pharyngitis	7	1	1
Enuresis		1	8
Tuberculous peritonitis			3
Tuberculosis of the chest	1		1
Cervical adenitis			1
Adenitis	3	2	3
Bronchitis	5	2	7
Tenia nana			2
Underweight	9	5	15
Scabies	1	2	
Poliomyelitis	1 Died	1	
Scoliosis	1		
Amebic dysentery			1
Influenza		1	2
Facial paralysis		1	
Ringworm	1		
Pneumonia	1		
Hernia	5		
Gonococcal infection			1
Pylorospasm	3		
Pseudohypertrophic dystrophy		1	
Pinworms			2
Asthma	1	1	4
Dermatitis	2		4
Ichthyosis	1		
Thymus	1		
Epididymitis	1		
Dental caries	1	1	1
Convulsions		3	3
Pyelitis	1		
Club feet		1	
Empyema			1
Paralysis			1
Encephalitis	1		
Ophthalmia	1		
Periostitis	1		
Phimosis	6	1	7
Sinusitis	2		1
Mastoiditis	1 Died		1
Chicken-pox	1		1
Hydrocele		1	1
Scurvy			1
Whooping cough	1	1	
Defective vision			1
Microcephalus	1		
Epilepsy			1
Overweight			1
Speech defects			1
Jaundice (Newborn)	1		
Hemorrhage	1		

at present. There was only one case to be found and that was in Group 3. So few children received fresh fruit juice that we believe that there must be something in the poor man's diet that supplies the antiscorbutic vitamin to his offspring and this may be the primary cause for the absence of scurvy.

TUBERCULOSIS

Patients who are markedly undernourished and underweight may be suspected of having tuberculosis in one form or another. While tuberculin tests were not done on many of our patients, roentgenograms were taken of children who were associated with tuberculous patients, or whose physical examination suggested tuberculosis. Tuberculosis peritonitis was found in 3 cases in this third group and one case of tuberculosis of the chest was found in Group 1. One case of tuberculous adenitis with no signs in the chest occurred in Group 3.

Tuberculosis seems to be on the decline in the South and it is remarkable that we saw very little among the class of patients treated in our clinic.

The most common combinations of diseases were:

Table 5

Diarrhea and otitis media	42
Diarrhea and malnutrition	42
Otitis media, tonsillitis and nasopharyngitis	40
Tonsillitis and underweight	38
Otitis media and underweight	31
Impetigo and underweight	25

In this table we notice an interesting phenomenon in that diarrhea and otitis media are common in 42 cases. Is it possible to attribute some relation between infection of the ear and infection of the intestinal tract in young infants? It is known that middle ear infection is a frequent occurrence in infants with diarrhea, but otitis media is also a common occurrence in infants who show a marked lowered resistance due to acute or prolonged chronic diseases. Does otitis media act as a precursor of diarrhea and could one attribute a severe intestinal intoxication of this nature to a middle ear disease as a parenteral etiological factor? We believe that the average pediatrician can distinguish infectious diarrhea from a diarrhea due to ordinary food disturbances. A correction of diet should shortly clear up a fermentative diarrhea, while the symptoms of infectious diarrhea present marked drowsiness, apathy, persistent fever, dehydration, loose stools with some blood and leucocytes and many times pus. Ten of the 42 cases presented marked signs of acute intoxication with profuse watery stools. On examination of the ear, one or both drums were usually bulging and eight had discharges of pus later. Paracentesis was done in all cases, and in the other 32 who showed no marked intoxication or fever, ears were found to be discharging yellowish pus. It is interesting also to note that in the 32 cases otitis media had not been present previously, but after somewhat prolonged diarrhea, middle ear infection developed. These patients had no previous cold so far as we know, and the diarrhea did not disappear after opening of the ears. Following Dean's study of the relation of the infection of the ear and infection of the intestinal tract, many pediatricians advised mastoidectomy in all cases of severe acute intestinal intoxication when intestinal infection persisted for some time. The removal of the possible cause by a paracentesis did not relieve the condition in the intestinal tract. However, these patients in time were relieved of this condition through ordinary medicines and by detoxifying them. One patient was operated upon, a mastoidectomy was done and pus found, but he died shortly after the operation. No autopsy was done, and it could not be determined whether there was a pathological condition in the intestinal tract. It is claimed that usually none is found. We believe that this case was moribund and that the condition was terminal in its effects. Should otitis media play such an important part in certain cases of diarrhea that are supposed to be secondary, or is it a condition which is common in children who are exhausted from their long illness? We have an equal number of patients, 42 in number, with diarrhea. Most of these were found to be suffering from poor management and improper feeding and in this group 15 were very severely ill with high fever, marked intoxication, and loose watery stools. None of these exhibited any involvement of the middle ear, and all, whether suffering from infectious or fermentative diarrhea, recovered, except one patient who died without showing any signs of involvement of the ear. That undernourishment is the basic cause of otitis media can be demonstrated in 31 undernourished children in whom otitis media was prevalent, especially after these patients exhibited marked loss of weight and chronic intestinal indigestion. The other 40 cases of otitis media occurred in children who from time to time suffered from nasopharyngitis and tonsillitis.

It is interesting to note in general that in a study of over 400 clinic children 113 exhibited

diseases of the ear. This is over 25 per cent of all cases and certainly demonstrates that in the South ear infections are very prevalent. Climatic conditions and ignorance as to diet on the part of poor Southern white women is the cause of the great numbers of infections of the ear in their children.

Wishart made a study of the relation of infections of the ears and infections of the intestinal tract in infants. A few of his conclusions follow:

(1) Many authors believe that infection in the mastoid antrum is the cause of acute intestinal intoxication in infants.

(2) The onset of the disease is rarely characterized by a "cold."

(3) The great majority of the infants were without any clinical evidence of an upper respiratory infection at the time that they were toxic.

(4) Many infants remained without any ear infection throughout the whole course of the illness.

(5) Both ear drums of many showed abnormality immediately preceding death. This change is an antemortem phenomenon due to forcible ejection through the eustachian tubes. When mastoid infection exists, it is the result and not the cause of the child's lowered condition.

(6) Bilateral mastoid operation as a cure for disease was a failure. Operation is to be postponed as long as possible.

DIET IN CHILDREN

It is interesting to note that besides the regular breast feeding or artificial milk feeding, little was added to the diet in the children's first year. Only 12 children received cereals and orange juice when they were seen by us, and only a small number had vegetables added to their diet. Cod liver oil was given to none until the child was seen by the nurse and advised to take it. Rickets was present in 36 cases, 26 of which were found in Group 1. Scurvy was present in one patient. It is possible that the fact that pasteurized milk was used in all cases, without boiling, accounts for the finding of only one case of scurvy, when very little fresh juice and vegetables were given to the children in our study.

In Groups 2 and 3, 214 patients were studied as to their diet. One hundred and fourteen were found to receive a good balanced general diet. Thirty-two were living on a very poor diet. Some did not receive a sufficient amount of food to be able to gain and grow properly. Fifteen children lived mostly on buttermilk, ten lived on syrup, fat meat and bread. To 15 children coffee was given freely. Milk was used by 10 in the diet, orange juice was given to 10 and 3 children lived chiefly on grits and rice.

It was difficult to get accurate information about diets in many cases, as only those who received a well balanced diet were willing to go into the details of feeding. The milk used by most of the patients was pasteurized when it was not canned. While we believe that pasteurization is a great aid to the ignorant poor, we must admit that the grade of milk is usually very poor, because nearly all the patients fed on this diet sooner or later developed fermentative diarrhea. A few children who received milk from a privately owned cow did apparently much better than those fed on pasteurized milk. Pellagra was not found in any case.

Table 6

DIETS OF CHILDREN

	Group 1	Groups 2 & 3
Good general diet		114
Very poor diet, almost nothing		32
Cereals	12	
Buttermilk (chiefly)		15
Syrup, fat meat and bread (chiefly)		10
Coffee		15
Milk		10
Orange juice	12	10
Rice and grits (chiefly)		3
Vegetables	5	5

The diet of the families was not of great importance. We can, however, surmise from this table that in the cases of the families who ate very cheap food their children from one to six years of age received the same diet. It is a notable fact that poor people bring their children to the family table much earlier than the well-to-do and no doubt a great deal of indigestion in children is due to improper diet of the parents.

The effect of the type of home on malnutrition may be studied by the following table:

Table 7

Disease	Type of Home Good	Bad
Diarrhea	34	37
Otitis media	40	33
Improper feeding	32	32
Tonsillitis	23	28
Eczema	3	5
Influenza	2	1
Rickets	13	11
Impetigo	8	12
Enuresis	4	5
Pharyngitis	3	3

We can see in general that disease was about equally divided between good and bad homes. This is especially true of diarrhea. Many other factors are involved besides the home surroundings. In general it may be said that disease is expected to be more common in unhygienic surroundings.

There were only six deaths reported in our series and all were classified under Group 1, from birth to one year.

Table 8

	Group 1
Possible thymus	1
Unknown	1
Poliomyelitis	1
Leukemia	1
Mastoid	1
Diarrhea	1

COMMENT

Five hundred Southern white clinic children were studied. Seventy-six children were found normal. Malnutrition seemed to be prevalent in most of the cases examined.

The diseases most commonly found were as follows:

(1) Diarrhea	84
(2) Otitis media	113
(3) Improper feeding	78
(4) Tonsillitis	78
(5) Underweight (first cause for coming to clinic)	29
(6) Rickets	36
(7) Eczema	9
(8) Tuberculosis	5
(9) Syphilis	4

Diarrhea, tonsillitis and otitis media certainly stand out as etiological factors of malnutrition in all children. Strange to say, although cod liver oil and orange juice were not part of the dietary, scurvy was present in only one case and rickets in 36.

Weaning and early supplementary feeding play a great part in diminishing resistance in the Southern child. Climate seems to add very much to the etiology of diarrhea and tonsillitis. Diarrhea is a common finding in the South, due to climate and the ignorance of clinic patients.

SUMMARY

(1) A study was made of the relation of otitis media and intestinal infection in infants. We do not believe that there is any interrelation between the two.

(2) The children of clinic mothers are being partially weaned at an early age. Cow's milk does not seem to be a substitute feeding. More canned milks are used, resulting in diarrhea and underweight.

(3) Severe general weakness and undernourishment is easily responsible for weakened resistance and a cause for diarrhea and otitis media in the South.

(4) Ignorance as to feeding results in diarrhea and chronic intestinal indigestion.

(5) Climate is responsible for the aggravation of tonsillitis, otitis media and diarrhea, and these diseases are more typically Southern.

(6) Proper supervision of the milk supply must be made to obtain better results in feeding. This is lacking in our City.

(7) The importance of prenatal teaching in the South has been stressed too little. As a result there is much general disorder of digestion in young infants, due to ignorance of the mothers.

(8) Proper educational facilities should be supplied to the poor so that they may learn the necessity of proper supervision of healthy children.

(9) Syphilis and tuberculosis are on the wane in the South.

(10) Economic conditions are responsible for many of these conditions, since pauperism leads to ignorance. However, since many children are weaned by mothers who are not working, we believe that laziness in the South is also responsible for malnutrition in young children.

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DISCUSSION (*Abstract*)

Dr. D. Lesesne Smith, Spartanburg, S. C.—We have an indefinite mental picture which coincides with the figures which Dr. Yampolsky has put down on paper for us. This is the first attempt to fix definitely these facts. We have similar figures on clinics in other parts of the country but none for our section, as far as I know. The relation of ear conditions to other diseases is of interest.

Dr. Yampolsky (closing).—While otitis media and diarrhea cannot be associated, we believe that both of these conditions continue to be problems in the South. A better knowledge of food problems that confront us will probably eliminate many of the gastro-intestinal disturbances found in our part of the county. The use of canned foods seems to be encouraged by the physician. They cannot always and should not replace foods that can be obtained in their natural form.

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ARTHRITIS AND PARATHYROIDECTOMY

The parathyroids are in a peculiarly advantageous position for clinical study. Their hormone has been isolated. When it is injected into the blood stream it raises the serum calcium in proportion to the units injected as promptly as insulin lowers the blood sugar. The serum phosphorus is lowered at the same time. A clinical syndrome of parathyroid deficiency, with low blood calcium (tetany) is well known. A clinical syndrome of parathyroid adenoma, with high blood calcium, is also established. This is the condition of generalized thinning of the bone cortex with bone cyst formation throughout the body, known as osteitis fibrosa cystica, or von Recklinghausen's disease, much studied in recent years and symptomatically relieved by parathyroidectomy.

It has been suggested that other better known disorders may result from disturbed calcium balance and be thus related to malfunction of the parathyroids. Rickets is the best known disease of calcium and phosphorus metabolism. In experimental rickets the parathyroid glands commonly hypertrophy. The reaction is apparently an attempt to conserve calcium and may be compared with the hypertrophy of the thyroid when iodine is deficient in the diet. Rickets is so frequent an infantile disorder that if it could be shown to result in permanent parathyroid injury, it would be necessary to believe that normal parathyroids are rare in adult life.

Since 1930, various investigators have attempted to relate arthritis and several other diseases of the skeleton such as Paget's disease of bone, to overactivity of the parathyroid glands, and to treat these by parathyroidectomy. Considerable discussion upon this subject took place at the last meeting of the American and British Orthopedic Associations, in Toronto. Ballin,[1] of Detroit, reported the performance of 45 parathyroidectomies for various bone diseases, muscular hypotonia, kyphosis with compressed vertebrae, and Paget's disease (osteitis deformans). In cases of intractable backleg aches, curving of the spine, shortening of the stature, bone cysts, certain forms of arthritis, Ballin says, the patient should be studied for the presence of hyperparathyroidism.

Funsten,[2] of the University of Virginia, has examined 95 cases of arthritis, chiefly of the ankylosing type, for symptoms of hyperparathyroidism. In 26 of these he found suggestive evidence. Parathyroidectomy was done in 14 cases, and all but one were reported improved. Within a day or two following operation the stiffness and pain in the joints began to disappear. Later, roentgenograms showed increased density of the bones, or recalcification. The development of arthritis in the presence of parathyroid hyperfunction, according to Funsten, is a frequent occurrence.

Arthritis is, of course, one of the commonest of the intractable progressive diseases of modern life. Innovations in its treatment must arrest immediate attention.

Walter Bauer[3] and his associates, Albright and Aub,[4] of the Massachusetts General Hospital, working at times with Eugene Dubois[5] and his associates of New York, have done more de-

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tailed and laborious metabolic studies upon von Recklinghausen's disease than any other groups of workers. Through measurements of calcium intake in the diet, excretion in urine and feces, and blood serum levels over long periods in hospitalized patients, they have shown that a negative calcium balance (more calcium is lost than is ingested) occurs in von Recklinghausen's disease; that a parathyroid adenoma accompanies this clinical entity, and that the calcium balance becomes positive (calcium is retained) and the clinical symptoms are arrested upon surgical removal of the parathyroid tumor. Arthritis was not observed in any of their cases of parathyroid tumor, though one patient was followed for thirteen years. Those who claim to have relieved arthritis and other bone diseases by parathyroidectomy, according to Bauer, have observed their cases over a short period, and have produced no metabolic studies to bear out their diagnoses.

Bauer and his associates studied the total calcium and phosphorus metabolism of a series of cases of arthritis with marked bone atrophy and proliferative bone changes, but no evidence of negative calcium balance was found. Nachlas,[6] of Baltimore, in metabolic studies of 37 cases of arthritis, confirms the finding of normal calcium metabolism.

In the history of the treatment of arthritis many possible foci of infection have been removed. A large number of vaccines and antiseptics have been tried. Colloidal sulphur injections were recently recommended by Wheeldon and Main,[7] of Richmond.

Experimental production of arthritis in animals is not difficult. Injections of several species of bacteria of low virulence will cause enlargement and stiffness of the joints. Key,[8] of St. Louis, has produced arthritic changes by repeated injections into the joint cavity of a number of apparently harmless solutions, including dilute acid, dilute alkali, normal saline, 10 per cent saline, distilled water, and bacteria. He reports that arthritis follows necrosis of the cartilage or removal of a portion of it, and that the articular cartilage is the most vulnerable of the joint tissues.

If arthritis is due to alterations in the calcium metabolism, it must be concluded that calcium metabolism is upset by a variety of causes.

Judgment as to the clinical value of parathyroidectomy should rest for the time being rather in the hands of the biochemists than the surgeons.

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EPIDEMIC SYPHILIS IN CHILDHOOD

In civilized adults, syphilis attacks characteristically, and usually first, the reproductive organs. It is the great contraindication to child bearing. It attacks also, in a large per cent of cases, the cardiovascular system and central nervous system. It is believed to confer no immunity. Syphilis in children is usually congenital, the result of infection *in utero* from a syphilitic mother. Epidemic syphilis in children, in civilized countries, is unknown.

Hudson,[1] of the American Mission Hospital at Deir-ez-Zor, Syria, describes a type of syphilis in the desert Arabs which spreads like measles or whooping cough by non-venereal contact, occurs most commonly in childhood, and apparently confers some immunity, since the Bedouin expects to suffer from only one attack of it in his life. The course of the disease among these primitive people is in contrast to the expected manifestations of syphilis in civilized races. The condition is called by the Bedouins "bejel." In their crowded and insanitated tents, with common eating and drinking utensils, and promiscuous nursing of babies, it spreads rapidly. Flies, lice or other insects possibly transmit it. Occasionally, in answer to the inquiry if he has had bejel, the Bedouin replies: "Is there anybody who has not had it?" He considers it not a serious disease and will take treatment for it only when he is completely disabled. It is much commoner in the tent Arabs, according to Hudson, than in those who live in houses in the towns. Fifty-seven per cent of the tent Arabs, or Bedouins, who were admitted to the clinic had syphilis.

The largest per cent of cases, if they are divided according to the age at which the disease was contracted, occurred before the tenth year of life. About equal numbers of males and females were infected. There was little elevation

1. Hudson, Ellis H.: Syphilis in the Euphrates Arab. II. A Clinical Study of Arab Syphilis. Amer. Jour. Syph., 17:10, Jan., 1933.

of temperature. In late stages, skin and bone lesions were much commoner and more severe than in Europeans. General adenopathy was common. Serious cardiovascular disease was rare, in contrast to the course of syphilis in whites and negroes in this country. Damage to the central nervous system also was slight or absent and visceral lesions and kidney damage were slight. "Bejel" apparently did not attack the reproductive system so universally or so destructively as does civilized syphilis. Miscarriages among the women, which characterize civilized syphilis, seemed to be rare, and congenital syphilis was rare, though there was a high child mortality.

It was suggested that extensive childhood infection among this primitive people affords the body the opportunity to develop a certain degree of immunity, so that the reactions observed in syphilis of adult life, as it is known in this country, are to some extent circumscribed.

GLEANINGS FROM RECENT JOURNALS

Thorium Dioxide in Diagnosis of Diseases of the Liver and Spleen.—In the thirty years plus since discovery of the x-ray, no medical specialty has advanced more rapidly than roentgenology. In the early days of x-ray diagnosis, the x-ray was used only for examinations of bony structures and a few radiopaque shadows in the body, such as certain of the gallbladder or kidney stones. Very soon, however, came the notion that different parts of the body might be made radiopaque at will. Cannon and his associates administered bismuth to outline the gastrointestinal tract. About twenty-five years later began the development of the organic iodine compounds: tetra-iodophthalein and similar substances for the gallbladder, skiodan and related substances for the urinary tract, and oily iodine suspensions (lipiodol) for the bronchi, uterus, tubes and mammary glands. These substances, it will be noted, filled the hollow viscera of the body. A new principle is involved in the use of thorium dioxide for examination of liver and spleen; since it is employed to penetrate the cells of viscera which have no central cavity.

After intravenous injection into animals, thorium dioxide goes into the recticulo-endothelial cells of the spleen, liver, bone marrow, and suprarenal glands.[1] After two years, much of the thorium compound has been reported to remain in the tissues. It is believed to cause no ill effects.[1] It has been administered by Yater and Otell,[1] of Washington, D. C., and others to hospital patients with rather advanced liver disease. Enlargements of the liver and spleen were demonstrated; masses could be localized in the upper abdomen; metastases, tumors, cysts or abscesses in the liver could be detected and other types of intrahepatic disease could be determined.

Menville and Ane,[2] of Tulane University, New Orleans, have employed the same solution with a different technic to outline portions of the lymphatic system.

One naturally questions the advisability of injecting into the human body a substance which has no regular and rapid channel of excretion.

Heart Disease and Thyroidectomy.—Enlargement of the thyroid gland and symptoms of Grave's disease may be produced in guinea pigs and various small animals within a few days by injections of an acid anterior pituitary extract. Increase in the heart rate of the animals occurs on the second day of the injections, through the stimulation of the thyroid.[3] If the thyroid was removed, the heart rate did not increase. It is possible that some types of hyperthyroidism in human beings are the result of anterior pituitary overactivity, and that thyroidectomy is removal of the wrong gland, which leaves the etiological factor untouched. However, subtotal thyroidectomies have been performed for years, with good clinical results in many cases. Rosenblum and Levine,[4] of Harvard, have followed a series of cases of hyperthyroidism with significant heart disease to see what happened to the heart in the five years immediately following thyroidectomy.

The average age of their series of patients was about fifty, the average basal metabolism before operation plus 51, and the average postoperative metabolic rate about plus 5. There was marked immediate improvement following operation, in the various evidences of circulatory embarrassment such as congestive heart failure, angina pectoris and disturbing irregularities of the

1. Yater, W. M.; and Otell, L. S.: Differential Diagnosis of Diseases of the Liver and Spleen by the Aid of Roentgenography after Intravenous Injection of Thorotrast (Thorium Dioxide Sol). Amer. Jour. Roentgenol. & Ra. Ther., 19:172, Feb., 1933.

2. Menville, L. J.; and Ane, J. N.: A Roentgen Ray Study in Absorption of Thorium Dioxide from the Peritoneal Cavity of the Albino Rat. Proc. Soc. Exper. Biol. & Med., 30:28, Oct., 1932.

3. Hageman, P. O.; and McCordock, H. A.: Effect of Acid Extract of Anterior Pituitary on the Heart Rate and Nervous Irritability of the Guinea Pig. Proc. Soc. Exp. Biol. & Med., 30:297, Dec., 1932.

4. Rosenblum, H. H.; and Levine, S. A.: What Happens Eventually to Patients with Hyperthyroidism and Significant Heart Disease Following Subtotal Thyroidectomy. Amer. Jour. Med. Sci., 185:219, Feb., 1933.

heart. The improvement was very well maintained. Heart murmurs frequently disappeared. The heart size was not affected. A slight rise in the blood pressure was noted. The patients' general condition and heart action were thus apparently improved five years after operation.

Pelvic Shape and Fetal Position.—Thoms,[5] of Yale, confirming other reports, says that an occipito-posterior position of the fetus occurs when the maternal pelvis is of a particular shape. He studied 20 pelves in which the chief deviation from the normal was a relative or real decrease in the transverse diameter of the superior strait. Every case of this type was associated with a primary or persistent occipito-posterior position. His average figures for the measurements of the cases were: transverse diameter 1.31 cm. less than normal (13 cm. is normal); and conjugata vera 1.75 cm. more than normal (11 cm. is normal). This type of pelvis he believes more common than has been thought.

TWENTY-FIVE YEARS AGO

From the SOUTHERN MEDICAL JOURNAL, 1908

Dr. William Litterer, of Nashville, Tennessee, in a paper on "Treatment and Prevention of Tuberculosis by Tuberculin Immunization" says: "Experiments on animals demonstrate the possibility of creating immunity to tuberculosis by the use of the tuberculins.

". . . . The time is not far distant when individuals showing a tuberculous tendency will submit themselves to repeated injections of some form of tuberculin as a means of prophylaxis against this disease."

Dr. A. Morgan Cartledge, Louisville, Kentucky, says: "If I can be cured of infections of the gallbladder and calculi by medicinal agents, I don't want to be cured that way. I want the gallbladder and ducts drained so as to get a lasting cure.

". . . . The recurring bilious, and families with inherited liver disease, headache and malaria, should have a simple cholecystotomy and drainage. Likewise the dejected and melancholic."

Dr. Raymond Custer Turck, Extra-mural Professor of Surgery, Chicago Postgraduate Medical School, Jacksonville, Florida, writing on "The Leucocytes in Appendicitis," says: "Every case showing a neutrophilia above 80 per cent has a serious infection, the higher the neutrophilia the more virulent the process."

5. Thoms, Herbert: A Type of Pelvis Intimately Associated with Occipito-posterior Position. Surg., Gyn. & Obst., 56:97, Jan., 1933.

Book Reviews

Practical Obstetrics for Students and Practitioners. By P. Brooke Bland, M.D., Professor of Obstetrics, Jefferson Medical College; Chief Obstetrician, Jefferson Medical College Hospital, Philadelphia, Penna. Assisted by Thaddeus L. Montgomery, M.D., Associate in Obstetrics, Jefferson Medical College, Philadelphia, Penna. 730 pages, illustrated with 516 engravings, including 21 colored plates. Philadelphia: F. A. Davis Company, Publishers, 1932. Cloth, $8.00.

This book is written to fill a place between the large work and the small manual. While not so comprehensive as Williams or DeLee, it is complete, and for the student or general practitioner has the advantage of being more or less didactic. The general plan of the book is similar to that of other texts. The illustrations in the section on anatomy, a subject best taught pictorially, are only fair, but as a whole the book is well illustrated. The section on physiology is up to date and includes a diagram representing the correlation of ovarian function in menstruation and pregnancy. The biological tests for pregnancy are described and colored plates illustrate the positive reaction in both the Aschheim-Zondek and Friedman tests.

In discussing the management of labor, the author rightly warns against unnecessary pelvic examination, but does not make clear the importance of a vaginal examination done properly and promptly to determine the exact situation when pathological conditions have arisen. No differentiation is made between rheumatic chorea complicated by pregnancy and the more serious type of chorea which is itself a complication of pregnancy. In describing methods of inducing labor no mention is made of the old procedure of artificial rupture of the membrane, used with a Watson medical induction. This method has lately been revived and employed with excellent results. Emphasis is placed upon the fact that eclampsia is not a surgical emergency and several methods of medical treatment are outlined in detail. When the physical condition of the patient makes further pregnancy unwise the author states that the physician should instruct the patient in means of prevention. A helpful chapter on obstetrical jurisprudence concludes this worth-while book.

Internal Medicine: Its Theory and Practice. Edited by John H. Musser, B.S., M.D., F.A.C.P., Professor of Medicine in the Tulane University of Louisiana School of Medicine; Senior Visiting Physician to the Charity Hospital, New Orleans, Louisiana. 1316 pages, illustrated. Philadelphia: Lea & Febiger, 1932. Cloth, $10.00.

A text-book of medicine should offer the student accurate and relatively detailed pictures of disease. It must give the practitioner a ready source of information free from bias and unproved theory. For the teacher it must be a source of information, a text-book in very fact. Books the product of an individual or

of a single clinic rarely are well balanced; those presenting a great number of collaborators may be difficult to read from diversity of style.

The present volume departs somewhat from conventional lines. The number of authors is small, each is a teacher of medicine of professorial rank and each has covered a rather broad field in internal medicine. This makes for a logical arrangement of the subject matter, a personal quality in its presentation and a certain continuity of style. Where the subjects permit, the authors have prefaced their chapters with a brief but comprehensive discussion of the group of diseases under consideration. The broader aspects of etiology and pathological physiology have been stressed in these introductions.

The book is divided into four parts. Part I covers the infectious diseases. Here the diseases of bacillary, coccal, virus, rickettsial, spirochetal, protozoal, metazoal, fungous and unknown etiology are described. The contagious diseases of childhood, grouped in one chapter, are included in this section. It is not altogether clear, however, why tuberculosis is not included in this portion of the book instead of being relegated to the chapter on diseases of the respiratory tract.

Part II, which is devoted to the systemic diseases, is excellent throughout. The presentation of diseases of the heart and pericardium is noteworthy for its clarity and conservatism. The discussion of disorders of rhythm and the physiological aspects of treatment are particularly valuable. The chapter on diseases of the gastro-intestinal tract is stimulating and refreshing, and while in a measure controversial, it offers much that is helpful in the management of conditions that are the bete noir of the practitioner. The newer aspects of the physiology of nephritis and nephrosis as well as recent advances in methods of diagnosis and treatment are excellently set forth in the valuable chapter on diseases of the urinary tract. The discussion of the diseases of the endocrine glands is praiseworthy for its adherence to known facts, the vividness of its clinical descriptions and the conservatism of its therapeutic suggestions.

Part III deals with diseases of metabolism, nutrition, allergy and those due to physical, toxic and chemical agents. Here again prime emphasis is laid on morbid physiology and the chemical, metabolic, immunological and physical factors active in the various conditions are adequately described. The clinical pictures are clearly drawn and therapeutic procedures definitely outlined.

Part IV is the section on diseases of the nervous system. The mental disorders and organic diseases of the nervous system are discussed in separate chapters, the psychoses and neuroses more fully and much more fortunately than in most books on internal medicine. The organic and psychic backgrounds, the symptomatology and management of mental diseases are presented with an admirable simplicity of terminology. The inclusion of a glossary of neuro-psychiatric terms is a helpful detail. The chapter on organic diseases of the nervous system gives a rather detailed outline of methods of neurological examination. The clinical descriptions are clear and brief; in some instances more detail might be helpful.

As a whole the book is an excellent presentation of present-day medical thought. It is well balanced, free from repetition, logically arranged and readable to an unusual degree.

The Heart Rate. By Ernst P. Boas, M.D., Associate Physician, Mt. Sinai Hospital, New York City, and Ernst F. Goldschmidt, Ph.D., Research Fellow (1930-31), Department of Surgery in the Yale University School of Medicine. 166 pages. Springfield, Illinois, and Baltimore, Maryland: Charles C. Thomas, Publisher, 1932. Cloth, $3.50.

This monograph, giving cardiotachometer studies of 356 persons, is presented in two sections. The first contains readings of 51 men and 52 women. The graphs show the normal heart rate and its variations as recorded over a period of twelve to twenty-four hours. These findings are preceded by chapters tracing the application of pulse mensuration to medical diagnosis; a description of the cardiotachometer. The second section records the heart during operations and under such conditions as cardiac insufficiency, valvular disease, myocarditis, thyrotoxicosis, auricular fibrillation, sinus tachycardia and heart block.

These cardiotachographs are discussed in relation to the findings of other observers and the general condition of the subject. Those made while the patients were asleep are of special importance, as no other work has been so complete. The series, while small, represents a noteworthy contribution to the accurate study of heart behavior.

Hints to the Young Practitioner. By G. Francis Smith, M.R.C.S. (Eng.), L.R.C.P. (Lond.), Consulting Surgeon, Peace Memorial Hospital, Watford; Late Surgeon, The Hospital, Newcastle, New South Wales; Late Surgeon, Hertfordshire, Constabulary. 150 pages. New York and London: Oxford University Press, 1932.

A small book designed to aid the tyro in commencing his career. While the book is full of good medical pointers, it is written from the standpoint of British practice and hence its value is lessened to the American student.

The Medical Record Visiting List or Physicians' Diary for 1933, Revised. Baltimore: William Wood & Co., Medical Publishers.

Available in various sizes and pocket visiting list will reduce record keeping to a minimum. In addition to this feature there is also a fund of information concerning dosage, contagious diseases, the treatment of poisoning, calendar, obstetrical charts, spaces for special memoranda and addresses. It is very convenient and useful.

Methods and Problems of Medical Education (Twenty-First Series). 226 pages, illustrated. New York: The Rockefeller Foundation, 1932.

The problems and methods of nursing education are discussed in this volume. It is the last of a series embracing the entire field of medical education and is world-wide in scope. Staff members of the various nursing schools describe the institution. Curricula and teaching modes are given in detail. The training of nurses can be brought to a higher standard by the proper application of the data which has been accumulated in this book.

Southern Medical News

The American Association for the Study of Goiter will meet in Memphis, Tennessee, May 15, 16 and 17, at the Peabody Hotel. A program covering the many phases of goiter has been arranged. Any physician in good standing in his local medical society is eligible to attend and participate in the discussions. Dr. Henry S. Plummer, Rochester, Minnesota, is President, and Dr. R. M. Howard, Oklahoma City, Oklahoma, President-Elect. Dr. A. G. Payne, Greenville, Mississippi, is a member of the Executive Council. Dr. R. L. Sanders, Memphis, Tennessee, is Chairman of the Program Committee. The Association is arranging a delegation to the International Goiter Conference to be held in Berne, Switzerland, August 10-12, 1933. Anyone interested should communicate with Dr. J. R. Yung, Corresponding Secretary, Terre Haute, Indiana.

ALABAMA

The Autauga County Medical Society has elected the following officers for 1933: Dr. R. M. Golson, Prattville, President; Dr. E. H. Downs, Billingsley, Vice-President; and Dr. J. E. Wilkinson, Prattville, Secretary-Treasurer.

The Barbour County Medical Society has elected the following officers for 1933: Dr. P. P. Salter, Eufaula, President; Dr. James Reid, Clayton, Vice-President; and Dr. E. M. Moore, Clayton, Secretary-Treasurer.

The Bullock County Medical Society has elected the following officers for 1933: Dr. J. W. Thomason, Midway, President; Dr. W. H. McCaslan, Union Springs, Vice-President; and Dr. J. K. Haygood, Union Springs, Secretary-Treasurer.

The Cullman County Medical Society has elected the following officers for 1933: Dr. C. E. Herrin, Cullman, President; Dr. J. G. Daves, Cullman, Vice-President; and Dr. M. S. Whiteside, Secretary-Treasurer.

The Houston County Medical Society has elected the following officers for 1933: Dr. C. W. Hilliard, President; Dr. W. P. Roberts, Vice-President; and Dr. F. G. Granger, Secretary-Treasurer; all of Dothan.

Deaths

Dr. Frederick Augustus McClain, Bessemer, aged 60, died January 8 of carcinoma of the esophagus.

Dr. Horace James Sims, Daphne, aged 61, died December 10 of myocarditis and acute nephritis.

Dr. Malcolm Ozro Grace, Ozark, aged 48, died January 2.

Dr. Charles Edward Thomas, Anniston, aged 62, died January 4.

Dr. Samuel Garrett Cardon, Center, aged 54, died January 6 in an automobile accident.

ARKANSAS

Dr. C. W. Smith, Houston, has been named physician for the Arkansas Confederate Home.

New members of the State Board of Health appointed by Governor Futrell are Dr. W. G. Hodges, Malvern, Dr. W. F. Smith, Little Rock, and Dr. Thomas Wilson, Wynne.

Dr. Oliver C. Melson, Little Rock, has been made a member of the Board of Governors of the American College of Physicians.

Dr. L. J. Kosminsky, Texarkana, President-Elect of the Arkansas Medical Society, is the newly elected Vice-President of the Missouri Pacific Surgeons' Association.

The Clay County Medical Society has elected the following officers for 1933: Dr. F. H. Jones, Piggott, President; Dr. J. P. Hiller, Pollard, Vice-President; and Dr. J. E. McGuire, Piggott, Secretary-Treasurer.

The Dallas County Medical Society has elected the following officers for 1933: Dr. H. A. Cheatham, Princeton, President; Dr. W. P. Ward, Fordyce, Vice-President; and Dr. J. E. M. Taylor, Sparkman, Secretary-Treasurer.

The Franklin County Medical Society has elected the following officers for 1933: Dr. W. H. Bollinger, Charleston, President; Dr. W. H. Gibbons, Ozark, Vice-President; and Dr. Thomas Douglass, Ozark, Secretary-Treasurer.

The Johnson County Medical Society has elected the following officers for 1933: Dr. George L. Hardgraves, President-Elect; and Dr. Earle H. Hunt, re-elected Secretary-Treasurer; both of Clarksville. Dr. G. R. Seigel, Clarksville, is the incoming President.

The Phillips County Medical Society has elected the following officers for 1933: Dr. M. Fink, Helena, President; Dr. J. W. Butts, Helena, Vice-President; and Dr. George R. Storm, West Helena, Secretary-Treasurer.

The Sebastian County Medical Society has elected the following officers for the coming year: Dr. S. J. Wolfermann, President; Dr. H. H. Smith, Vice-President; Dr. J. W. Amis, Secretary; and Dr. W. R. Brooksher, Treasurer; all of Fort Smith.

The White County Medical Society has elected the following officers for 1933: Dr. A. H. Hudgins, Searcy, President; Dr. T. E. Johnson, Vice-President; and Dr. Orlie Parker, Searcy, Secretary-Treasurer.

Deaths

Dr. Robinson C. Dorr, Batesville, aged 74, died January 29 of senility.

Dr. George L. Dickinson, Horatio, aged 76, died January 5 of pneumonia.

Dr. LaFayette Gracey, Jonesboro, aged 67, died January 1 of arteriosclerosis.

Dr. Elbert Hays Wilkes, Little Rock, aged 54, died January 25.

Dr. James H. Lindsey, Bentonville, aged 70, died February 2.

Dr. Claiborne Jackson March, Fordyce, aged 79, died January 11.

DISTRICT OF COLUMBIA

The Kober Day Celebration held each year to commemorate the birthday of Dr. George M. Kober, formerly Dean of the Georgetown University School of Medicine, was held this year on Tuesday, March 28, at which time the annual lecture was delivered by Dr. R. E. Dyer, of the United States Public Health Service. The medal, awarded annually for outstanding research, will be awarded this year to Dr. Alfred Newton Richards, Professor of Pharmacology at the University of Pennsylvania.

The George M. Kober Medical Society has elected the following officers for the coming year: Dr. Arnold McNitt, President; Dr. Tomas Cajigas, Vice-President; Dr. Ernest E. Hadley, Secretary; and Dr. Herbert H. Schoenfeld, Treasurer; all of Washington.

Dr. Edwin A. Merritt, Washington, has been chosen to deliver the Davidson Lecture in the fall, at which time Dr. Merritt will include the results of his recent extensive research work concerning parathyroids.

Deaths

Dr. H. Watson Moffitt, Washington, aged 48, died January 22 of heart disease.

Dr. Lee Richard Martin, Washington, aged 32, died January 31.

FLORIDA

Dr. R. L. Hughes, Bartow, was recently appointed a Lieutenant Colonel on the Governor's staff.

Friends of the late Dr. John S. Helms and citizens of Tampa recently met and organized the John S. Helms Memorial Association. At the organization meeting Dr. H. Mason Smith was elected First Vice-President; and Dr. Bundy Allen, Secretary; both of Tampa.

Dr. L. T. Furlow, Brooksville, was recently given a farewell dinner by friends on the eve of departure for St. Louis, where he will be located for the practice of surgery.

Dr. Sherman Forbes, Tampa, has returned home and resumed his practice after three months' work in the clinics of Vienna.

Dr. T. H. Wallis, Ocala, is the newly elected President of the local Kiwanis Club.

Dr. Thomas C. Thompson, Jacksonville, has moved into new offices at 1835 Laura Street.

Dr. W. J. Johnston, Sarasota, is the newly elected President of the Sarasota Kiwanis Club.

Dr. C. J. Heinberg, Pensacola, has been elected President of the local Kiwanis Club.

Dr. J. W. Hodges, formerly of Hampton, Virginia, is now located in Miami as house physician at the Gralynn Hotel.

Dr. and Mrs. Leigh F. Robinson, Fort Lauderdale, were hosts recently to physicians of the Memorial Hospital Staff and their wives.

Dr. Ralph H. Segrest and Miss Sarah Lee Green, both of Bonifay, were married recently.

The Broward County Medical Society has elected the following officers for 1933: Dr. H. J. Peavy, Fort Lauderdale, President; Dr. B. F. Butler, Hollywood, Vice-President; and Dr. O. C. Brown, Fort Lauderdale, Secretary-Treasurer.

The Lee County Medical Society has elected the following officers for 1933: Dr. H. Quillian Jones, President; Dr. Ernest Bostelman, Vice-President; and Dr. Robley D. Newton, Secretary-Treasurer; all of Fort Myers.

The Pasco-Hernando-Citrus County Medical Society has elected the following officers for 1933: Dr. L. H. Dame, Inverness,

Continued on page 22

The Patient Gets Both "A" and "D" When the Doctor Prescribes PATCH'S FLAVORED COD LIVER OIL

Since vitamins came so prominently into the medical picture, there has been a tendency to lay undue emphasis on one, to the utter disregard of others of perhaps equal importance.

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Doctors are using Patch's not merely as a prophylaxis and treatment of rickets and marasmus, but as a valuable aid in building resistance to infection.

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*Prather, E. O., Jr.; Nelson, Martha; Bliss, A. Richard, Jr.; Am. Jr. Dis. Children, 42-52, July, 1931.

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Continued from page 378

President; Dr. S. C. Harvard, Brooksville, First Vice-President; Dr. J. T. Bradshaw, Lake Jovita, Second Vice-President; and Dr. G. R. Creekmore, Brooksville, Secretary-Treasurer.

Deaths

Dr. George Smieding, Tampa, aged 56, died January 26.

Dr. Robert Edgar Baldwin, Tampa, aged 46, died February 2 of duodenal ulcer.

Dr. Dean Tyler Smith, Holly Hill, aged 72, died January 29.

Dr. William Bullard Jordan, Ocala, aged 40, died January 17.

GEORGIA

Dr. W. Frank Wells, Atlanta, was recently elected Chairman of the Fulton County Board of Health; and Dr. W. N. Adkins, Atlanta, was reelected Health Officer.

Dr. and Mrs. E. H. Lamb, Cornelia, recently entertained members of the Habersham County Medical Society.

Dr. S. C. Rutland, LaGrange, has been reelected Commissioner of Health for Troup County.

Dr. C. L. Ridley, Macon, has been elected Chairman of the Medical Staff of the Macon Hospital. Dr. I. H. Adams, Macon, is Vice-Chairman.

Dr. R. R. Bridges, formerly of Leary, has moved to Lumpkin to practice medicine.

Dr. Benjamin Franklin Jones, Atlanta, and Miss Mary Elizabeth Wyeth were married recently.

Members of the Jackson County Medical Society were entertained recently by Dr. and Mrs. M. B. Allen, Hoschton.

The following Atlanta physicians have been appointed Committee Chairmen of the Crawford W. Long Memorial Hospital and Clinic: Dr. Frank K. Boland, surgery; Dr. Mark S. Dougherty, records; Dr. John B. Fitts, curriculum; Dr. Ed. H. Greene, standardization; Dr. Shelley C. Davis, nursing; Dr. A. J. Ayers, autopsy; Dr. J. H. Nicholson, program; Dr. Allen H. Bunce, pathology; Dr. W. M. Dunn, interns; Dr. W. F. Lake, x-ray; and Dr. Archibald Smith, entertainment.

The Clarke County Medical Society has elected the following officers for 1933: Dr. A. C. Holliday, President; Dr. J. W. Davis, Vice-President; and Dr. H. B. Harris, Secretary-Treasurer; all of Athens.

The Emanuel County Medical Society has elected the following officers for 1933: Dr. W. H. Lucas, Stillmore, President; Dr. J. H. Chandler, Swainsboro, Vice-President; and Dr. R. C. Franklin, Swainsboro, Secretary-Treasurer.

The Hall County Medical Society has elected the following officers for 1933: Dr. Pratt Cheek, President; Dr. W. T. Meeks, Vice-President; and Dr. W. R. Garner, Secretary-Treasurer; all of Gainesville.

The Henry County Medical Society has elected the following officers for 1933: Dr. R. L. Tye, McDonough, President; Dr. R. L. Crawford, Locust Grove, Vice-President; and Dr. H. C. Ellis, McDonough, Secretary-Treasurer.

The Laurens County Medical Society has elected the following officers for 1933: Dr. William C. Thompson, President; Dr. John J. Barton, Vice-President; and Dr. Charles L. Hicks, Secretary-Treasurer; all of Dublin.

The Madison County Medical Society has elected the following officers for 1933: Dr. H. G. Banister, Ila, President; Dr. C. H. Bryant, Comer, Vice-President; and Dr. W. D. Gholston, Danielsville, Secretary-Treasurer.

The Muscogee County Medical Society has elected the following officers for 1933: Dr. J. H. McDuffie, Jr., President; Dr. Bruce Threatte, Vice-President; and Dr. J. B. Thompson, Secretary-Treasurer; all of Columbus.

The Telfair County Medical Society has elected the following officers for 1933: Dr. J. W. Neal, Scotland, President; Dr. C. R. Youmans, Lumber City, Vice-President; and Dr. C. J. Maloy, Helena, Secretary-Treasurer.

The Walton County Medical Society has elected the following officers for 1933: Dr. J. B. H. Day, Social Circle, President; and Dr. W. H. Lott, Monroe, Secretary-Treasurer.

The Washington County Medical Society has elected the following officers for 1933: Dr. O. L. Rogers, Sandersville, President; Dr. R. L. Taylor, Davisboro, Vice-President; and Dr. W. M. Cason, Sandersville, Secretary-Treasurer.

Deaths

Dr. Jesse Bowers McAfee, aged 47, died January 17 of pneumonia.

Dr. J. M. Gregory, Macon, aged 70, died January 9 of coronary thrombosis.

Dr. Henry F. Askam, Atlanta, aged 78, died suddenly January 19 of angina pectoris.

Dr. James Murray Cook, Sardis, aged 46, died January 2 in a hospital in Augusta.

Dr. Theodore Gourdin Kershaw, Augusta, aged 49, died at Asheville, North Carolina, January 27.

Dr. John N. Kennington, Danville, aged 64, died January 28.

Dr. Cornelius Edward Ware, Atlanta, aged 43, died February 2 of pneumonia.

KENTUCKY

The Bullitt County Medical Society has elected the following officers for 1933: Dr. G. W. Kirk, President; and Dr. S. H. Ridgway, Secretary; both of Shepherdsville.

The Harrison County Medical Society has elected the following officers for 1933: Dr. J. M. Rees, Cynthiana, President; Dr. G. H. Ross, Berry, Vice-President; and Dr. W. B. Moore, Cynthiana, Secretary-Treasurer.

The Henderson County Medical Society has elected the following officers for 1933: Dr. Francis Clark, President; Dr. E. N. Powell, Vice-President; and Dr. Walter O'Nan, Secretary-Treasurer.

The Laurel County Medical Society has elected the following officers for 1933: Dr. J. W. Crook, President; Dr. William Johnson, Vice-President; and Dr. Oscar D. Brock, Secretary-Treasurer; all of London.

The Scott County Medical Society has elected the following officers for 1933: Dr. D. B. Knox, Georgetown, President; Dr. L. L. Cull, Georgetown, Vice-President; and Dr. F. W. Caudill, Hazard, Secretary and Treasurer.

Mary Frances Hartnett has become Superintendent of the Clark County Hospital at Winchester, succeeding Katherine Drennon, who resigned.

Deaths

Dr. Grover Athey Beckett, Covington, aged 48, died January 17 of acute nephritis.

Dr. James Urey Ridley, Henderson, aged 50, died January 17 of cerebral hemorrhage.

Dr. Burton Adelbert Washburn, Paducah, aged 56, died December 13.

Dr. H. Rufus Boitnott, Dawson Springs, aged 56, died January 29 of septicemia.

Continued on page 24

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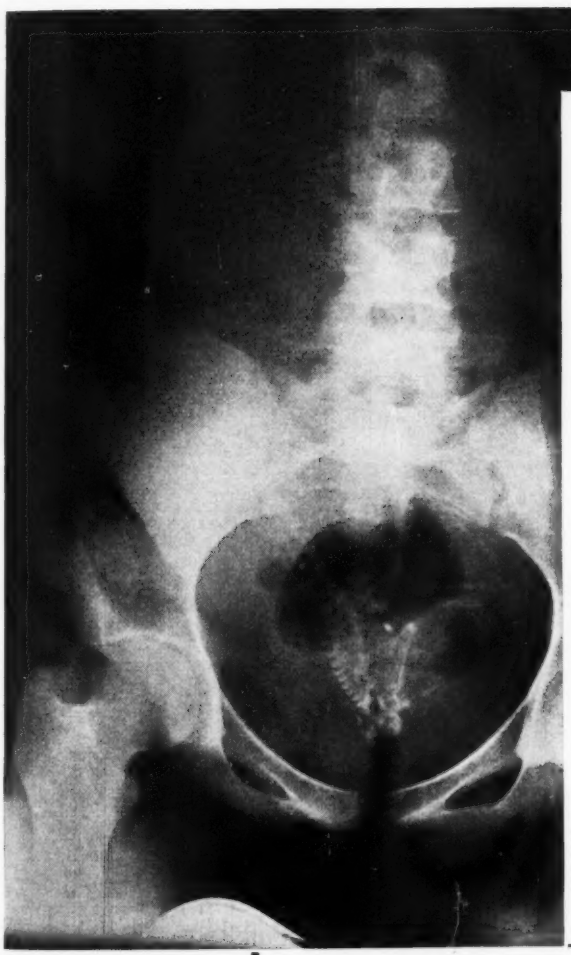

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Continued from page 22

Dr. Charles T. Lancaster, Sadieville, aged 69, died January 8 of cerebral hemorrhage.

Dr. Samuel Hampton Halley, Lexington, aged 61, died January 19 of heart disease.

Dr. Nelson Tatum Rice, Blaine, aged 86, died December 24 of pneumonia.

Dr. Ben L. Bruner, Louisville, aged 60, died December 15.

Dr. William Preston McGlenn, Louisville, aged 76, died January 22.

LOUISIANA

Dr. J. E. Knighton, Sr., Shreveport, has been elected to the Board of Governors of the American College of Physicians.

Dr. James Alexander White, Alexandria, and Mrs. Josephine Moore Bethune were married in January.

The Acadia Parish Medical Society has elected the following officers for 1933: Dr. H. L. Gardiner, Crowley, President; Dr. J. P. Parrott, Church Point, Vice-President; and Dr. A. B. Cross, Crowley, Secretary-Treasurer.

The Beauregard Parish Medical Society has elected the following officers for 1933: Dr. T. A. Guillory, Merryville, President; Dr. John D. Frazar, DeRidder, Vice-President; and Dr. R. L. Love, DeRidder, Secretary-Treasurer.

The Claiborne Parish Medical Society has elected the following officers for 1933: Dr. E. B. Middleton, Homer, President; Dr. M. J. Rivenbark, Homer, Vice-President; and Dr. H. R. Marlatt, Homer, Secretary-Treasurer.

The Lafayette Parish Medical Society has elected the following officers for 1933: Dr. C. E. Hamilton, President; Dr. R. S. Hernandez, Vice-President; and Dr. L. B. Long, Secretary-Treasurer; all of Lafayette.

The Morehouse Parish Medical Society has elected the following officers for 1933: Dr. W. A. Rogers, President; Dr. S. D. Graves, Vice-President; and Dr. L. E. Larche, Secretary-Treasurer; all of Bastrop.

The Ouachita Parish Medical Society has elected the following officers for 1933: Dr. J. W. Murphey, President; Dr. I. J. Wolff, Vice-President; and Dr. D. M. Moore, Secretary-Treasurer; all of Monroe.

The Rapides Parish Medical Society has elected the following officers for 1933: Dr. S. J. Phillips, President; Dr. E. Weiner, First Vice-President; Dr. B. H. Texada, Second Vice-President; and Dr. H. O. Barker, Secretary-Treasurer; all of Alexandria.

The Sabine Parish Medical Society has elected the following officers for 1933: Dr. R. B. Stille, President; Dr. W. D. Lester, Vice-President; and Dr. S. F. Fraser, Secretary-Treasurer; all of Many.

The Caddo Parish (Shreveport) Medical Society has elected the following officers for the coming year: Dr. F. H. Walke, President; Dr. A. B. Moise, First Vice-President; Dr. W. S. Kerlin, Second Vice-President; Dr. J. E. Knighton, Jr., Secretary; and Dr. D. R. McIntyre, Treasurer; all of Shreveport.

The Terrebonne Parish Medical Society has elected the following officers for 1933: Dr. R. W. Collins, President; Dr. J. W. Duval, Vice-President; Dr. S. F. Landry, Secretary-Treasurer; all of Houma.

The Tri-Parish Medical Society (East Carroll, Madison, West Carroll) has elected the following officers for 1933: Dr. W. H. Hamley, Lake Providence, President; Dr. G. W. Gaines, Tallulah, First Vice-President; Dr. W. McG. Dollerhide, Oak Grove, Second Vice-President; and Dr. G. D. Williams, Lake Providence, Secretary-Treasurer.

The Webster Parish Medical Society has elected the following officers for 1933: Dr. W. C. Summer, President; Dr. C. M. Baker, Vice-President; and Dr. Wilkins McDade, Secretary-Treasurer; all of Minden.

Deaths

Dr. James Valarus Bonnette, Alexandria, aged 67, died January 25 of cerebral hemorrhage.

Dr. Percy Bradford Lusk, New Orleans, aged 72, died January 25 of cerebral hemorrhage and edema of the lungs.

Dr. Andrew Shuttleworth Reisor, Shreveport, aged 49, died December 9.

Dr. Francis Marion Thornhill, Arcadia, aged 83, died December 5 of arteriosclerosis.

Dr. George Forrest Cocker, New Orleans, aged 67, died February 12.

MARYLAND

Dr. Louis Hamman, Johns Hopkins University, Baltimore, will give a clinical-pathological conference during the Stuart McGuire Lectureship series at the Medical College of Virginia, Richmond, in April.

Deaths

Dr. John Ayd, Baltimore, aged 79, died January 3 of carcinoma of the intestine.

Dr. William S. Richardson, Williamsport, aged 76, died December 29 of influenza.

MISSISSIPPI

The Staff of George C. Hixon Memorial Hospital, Electric Mills, recently conducted a health survey of Electric Mills school children, assisted by Dr. C. A. Ray, Jr., dentist, from Meridian. The survey was sponsored by the Community Culture Club.

Dr. J. F. Scarborough, formerly of Laurel, where he has been doing industrial work for the past twenty years, has moved to Brookhaven, where he will engage in private practice.

Dr. R. H. Foster, formerly of Laurel, has moved to New York and is connected with a large hospital there as army surgeon.

Dr. Hugh Johnston has located in Vicksburg for his permanent residence, after completing his fellowship at the Mayo Clinic.

Dr. H. B. Oliver, formerly of Sledge, has moved to Duck Hill.

Dr. J. L. Parkes, formerly of Union, has moved to Neshoba.

The Greenwood-Leflore Hospital Staff has elected the following officers for the coming year: Dr. G. Y. Gillespie, Jr., President; Dr. J. P. Kennedy, Vice-President; and Dr. W. E. Denman, Secretary-Treasurer; all of Greenwood.

Dr. D. T. Sayle has moved from Highlandale, Leflore County, to Black Hawk, Carroll County.

Dr. George W. Baskerville, Greenwood, has succeeded Dr. W. C. Brewer, deceased, as Chief Surgeon of the Columbus and Greenville Railway Company.

Dr. W. R. Card has moved from Houlka to Cockrum.

Dr. Frank O. Schmidz, Ocean Springs, and Miss Helen Compton Richards were married recently.

Dr. J. R. Lavender, formerly of Milport, Alabama, has located in Columbus, with offices in the Dispatch Building.

Dr. Hewitt Hassalle Robinson, Meridian, and Miss Jeanette Hamilton were married in January.

Continued on page 26

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Manufacturers to the Medical Profession, only, Since 1919

Continued from page 24

DEATHS

Dr. William Harvey Hardin, Calhoun City, aged 81, died January 20 of chronic nephritis.

Dr. John H. Walton, Como, aged 79, died November 30 of cerebral hemorrhage.

Dr. Mace H. Bell, Vicksburg, aged 53, died February 1.

MISSOURI

Dr. J. G. Moore, Mexico, a member of the State Legislature, was presented with resolutions recently adopted by the House of Representatives honoring him on his seventieth birthday.

Dr. Archer O'Reilly, St. Louis, President of the Missouri Society for Crippled Children, was recently appointed Associate Professor of Orthopedics in the St. Louis University School of Medicine. Dr. O'Reilly will be connected with the Firmin Desloge Hospital, where he will conduct extensive work for crippled children.

Dr. G. Leonard Harrington, Kansas City, is at the Chicago Institute for Psychoanalysis studying under Professor Franz Alexander of Berlin.

The former Josephine Hospital, St. Louis, reopened February 1 under the direction of the Sisters of Charity of the Incarnate Word, and will be known as the Josephine Heitkamp Memorial Hospital.

Dr. Spence Redman, Platte City, was recently honored on his seventy-fifth birthday and the fiftieth anniversary of his entrance in the practice of medicine, when he was given a dinner by Dr. and Mrs. L. C. Calvert, Weston. Members of the Platte County Medical Society were invited.

Dr. P. C. Turner is the newly elected Superintendent of General Hospital No. 2, Kansas City.

The Boone County Medical Society has elected the following officers for 1933: Dr. Frank G. Nifong, President; Dr. E. D. Baskett, Vice-President; and Dr. S. D. Smith, Secretary-Treasurer; all of Columbia.

The Callaway County Medical Society has elected the following officers for 1933: Dr. R. N. Crews, President; Dr. C. C. Ault, Vice-President; and Dr. A. D. Ferguson, Secretary-Treasurer; all of Fulton.

The Cass County Medical Society has elected the following officers for 1933: Dr. H. A. Brierly, Peculiar, President; Dr. A. R. Elder, Harrisonville, Vice-President; and Dr. J. S. Triplett, Harrisonville, Secretary-Treasurer.

The Greene County Medical Society has elected the following officers for 1933: Dr. J. H. Fulbright, President; Dr. Guy D. Callaway, Vice-President; Dr. J. N. Wakeman, Secretary; and Dr. W. E. Handley, Treasurer; all of Springfield.

The Grundy County Medical Society has elected the following officers for 1933: Dr. William H. Winningham, Trenton, President; Dr. U. C. Weston, Galt, Vice-President; and Dr. E. A. Duffy, Trenton, Secretary and Treasurer.

The Pemiscot County Medical Society has elected the following officers for 1933: Dr. J. W. Johnson, Hayti, President; Dr. G. W. Phipps, Caruthersville, Vice-President; and Dr. W. R. Limbaugh, Hayti, Secretary-Treasurer.

The Ste. Genevieve County Medical Society has reelected officers for the coming year as follows: Dr. J. A. Wilkins, St. Marys, President; Dr. G. M. Rutledge, Ste. Genevieve, Vice-President; and Dr. R. W. Lanning, Ste. Genevieve, Secretary-Treasurer.

The St. Louis Ophthalmic Society has elected the following officers for 1933: Dr. M. W. Jacobs, St. Louis, President; Dr. E. C. Spitze, East St. Louis, Illinois, Vice-President; Dr. C. T. Eber, St. Louis, reelected Secretary; Dr. W. M. James, St. Louis, Treasurer; and Dr. H. C. Knapp, St. Louis, Editor.

The Kansas City Southwest Clinical Society held its March clinic at St Luke's Hospital, Kansas City, on March 14.

DEATHS

Dr. Joseph P. Ghio, St. Louis, aged 58, died suddenly January 10 of heart disease.

Dr. Gerhardt Herman Raithel, Washington, aged 61, died December 25 of heart disease.

Dr. August Kleykamp, St. Louis, aged 74, died December 6 of heart disease.

Dr. James Ashworth, Westplains, aged 83, died January 8 of influenza.

Continued on page 28

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Continued from page 26

Dr. James Bowdon Bird, Kansas City, aged 51, died January 27 in an automobile accident.

Dr. George M. Mockbee, Hillsboro, aged 74, died January 2 of heart disease.

Dr. Marshall Baker, Webster Grove, aged 87, died January 6 of chronic myocarditis.

Dr. Jasper LeRoy Atherton, Springfield, aged 53, died December 4 of coronary thrombosis.

Dr. Caryl A. Potter, St. Joseph, aged 46, died January 23 of complications developing from an infection of the hand.

Dr. John P. Andrews, Marionville, aged 85, died November 21 of chronic nephritis.

Dr. Henry Muetze, St. Louis, aged 69, died January 25 following a stroke of apoplexy.

NORTH CAROLINA

Dr. Charles W. Banner, Greensboro, has been elected President and Chief of Staff of the Sternberger Children's Hospital at Greensboro; Dr. Charles R. Reaves was elected Vice-President; and Dr. Marion Y. Keith, Secretary.

Dr. Henry H. Menzies, Hickory, has been elected President of the Catawba Valley Medical Society.

Dr. A. W. Peede, Lillington, has been elected County Physician for Harnett County.

Dr. D. E. Ford, formerly Health Officer for Craven County, has been elected Health Officer for Beaufort County.

Dr. H. L. Brockmann, High Point, and Dr. J. T. J. Battle, Greensboro, have been elected members of the Guilford County Board of Health.

Dr. H. B. Moore, Graham, has been appointed County Physician and Quarantine Officer for Alamance County.

Dr. D. R. Bryson, Dr. A. M. Bennett and Dr. R. M. Waldroup have been added to the Swain County Board of Health.

Dr. Lester P. Martin, Mocksville, is the newly elected Health Officer for Davie County, succeeding Dr. S. A. Harding.

Dr. S. Glenn Wilson has been reelected County Health Officer for Sampson County.

Dr. G. E. Newby is the newly appointed Health Officer for Perquimans County.

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Dr. D. M. McIntosh, Dr. J. F. Miller and Dr. F. D. Sinclair have been appointed members of the McDowell County Board of Health.

Dr. Jasper Stewart Hunt, Charlotte, has opened offices at 501-2 Professional Building.

Adelaide Perry, formerly of Johnson City, Tennessee, is Instructress of Nurses at the Asheville Mission Hospital.

Dr. Elias Sampson Faison, Faison, and Miss Gloria Jones were married in Vienna, Austria, in December.

Dr. Cecil Holmes Rand, Fremont, and Miss Lucile Slade were married in January.

The Randolph County Medical Society has elected the following officers for 1933: Dr. J. V. Hunter, Asheboro, President; Dr. C. S. Tate, Ramseur, Vice-President; and Dr. R. P. Sykes, Winston-Salem, Secretary and Treasurer.

Deaths

Dr. Espy Eugine Little, Statesville, aged 45, died January 11 in a Philadelphia hospital, following an operation for brain tumor.

Dr. Needham P. Boddie, Durham, aged 73, died January 26 of heart disease.

Dr. David Thomas Tayloe, Washington, aged 68, died January 10.

Dr. Thomas Claudius Bradwell, Waxhaw, aged 45, died January 20 of gangrene of the lung.

Dr. Joseph Dixon, Greenville, aged 68, died January 21 of cerebral arteriosclerosis.

Dr. A. L. Plummer, Denton, aged 51, died January 30 following an operation for an infected knee joint.

Dr. R. F. Floyd, Louisburg, aged 78, died January 14.

Dr. Fred T. Foard, Catawba County, died February 4.

Dr. W. H. Crowell, Whiteville, aged 68, died February 11 of pneumonia.

OKLAHOMA

Dr. T. D. Rowland, Shawnee, has been appointed local surgeon for the Santa Fe Railroad.

The Beckham County Medical Society has elected the following officers for 1933: Dr. V. C. Tisdal, Elk City, President; Dr. Phil DeVanney, Sayre, Vice-President; and Dr. C. F. Jones, Erick, Secretary-Treasurer.

The Canadian County Medical Society has elected the following officers for 1933: Dr. D. F. Stough, Sr., Geary, reelected President; Dr. P. F. Herod, El Reno, Vice-President; and Dr. D. F. Stough, Jr., Geary, reelected Secretary-Treasurer.

The Comanche County Medical Society has elected the following officers for 1933: Dr. Thomas R. Lutner, President; Dr. L. W. Ferguson, Vice-President; and Dr. E. Brent Mitchell, Secretary-Treasurer; all of Lawton.

The Craig County Medical Society has elected the following officers for 1933: Dr. Louis Bagby, President; Dr. D. B. Stough, Vice-President; and Dr. W. R. Marks, Secretary-Treasurer; all of Vinita.

The Custer County Medical Society has elected the following officers for 1933: Dr. K. D. Gossom, Custer, President; Dr. W. E. Seba, Leedy, Vice-President; and Dr. E. E. Darnell, Ponca City, Secretary-Treasurer.

The Garfield County Medical Society has elected the following officers for 1933: Dr. J. R. Swank, President; Dr. R. C. Baker, Vice-President; and Dr. J. R. Walker, Secretary-Treasurer; all of Enid.

The Greer County Medical Society has elected the following officers for 1933: Dr. W. O. Dodson, Willow, President; and Dr. J. B. Hollis, Mangum, Secretary.

The Jackson County Medical Society has elected the following officers for 1933: Dr. J. S. Stultz, President; Dr. C. G. Spears, Vice-President; and Dr. E. W. Mabry, reelected Secretary; all of Altus.

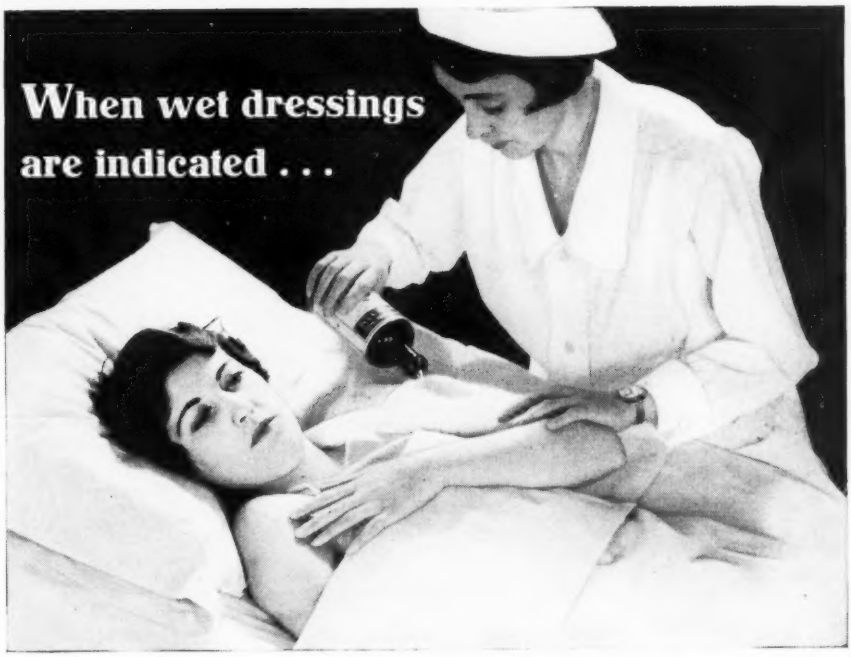
The Kiowa County Medical Society has elected the following officers for 1933: Dr. C. R. Preston, Mountain Park, President; Dr. J. M. Bonham, Hobart, Vice-President; and Dr. B. H. Watkins, Hobart, Secretary-Treasurer.

The Marshall County Medical Society has elected the following officers for 1933: Dr. P. F. Robinson, Madill, President; Dr. J. H. Logan, Lebanon, Vice-President; and Dr. J. H. Veazey, Madill, Secretary-Treasurer.

The McClain County Medical Society has elected the following officers for 1933: Dr. I. N. Kolb, Blanchard, President; Dr. W. C. McCurdy, Purcell, Vice-President; and Dr. O. O. Dawson, Wayne, Secretary.

The Payne County Medical Society has elected the following officers for 1933: Dr. D. J. Herrington, Cushing, President;

Continued on page 30



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PHILADELPHIA
BALTIMORE

Continued from page 28

Dr. D. A. Mitchell, Stillwater, Vice-President; and Dr. Katherine Beregrun, Stillwater, Secretary-Treasurer.

The Pottawatomie County Medical Society has elected the following officers for 1933: Dr. Clinton Gallaher, President; Dr. Horton Hughes, First Vice-President; Dr. R. C. Kayler, Second Vice-President; and Dr. H. G. Campbell, Secretary-Treasurer; all of Shawnee.

The Pushmataha County Medical Society has elected the following officers for 1933: Dr. D. W. Connally, Nashoba, President; Dr. H. C. Johnson, Antlers, Vice-President; and Dr. E. S. Patterson, Antlers, Secretary.

The Rogers County Medical Society has elected the following officers for the coming year: Dr. J. C. Bushyhead, Claremore, President; Dr. W. S. Mason, Claremore, Vice-President; and Dr. W. A. Howard, Chelsea, Secretary-Treasurer.

The Stephens County Medical Society has elected the following officers for 1933: Dr. C. N. Talley, Marlow, President; Dr. C. P. Chumley, Duncan, Vice-President; and Dr. D. Long, Duncan, reelected Secretary-Treasurer.

The Alfalfa County Medical Society has elected the following officers for 1933: Dr. H. E. Huston, President; Dr. D. Wendall Mercer, Vice-President; and Dr. L. T. Lancaster, Secretary-Treasurer; all of Cherokee.

Deaths

Dr. Joseph W. Moffett, Oklahoma City, aged 64, died December 5 of bronchopneumonia.

Dr. Benjamin D. Brown, Apache, aged 62, died December 25.

Dr. Albert Minear Fulton, Thomas, aged 64, died November 3 of pneumonia.

Dr. John Z. Mraz, Oklahoma City, aged 50, died January 12.

Dr. Ernest D. Mabry, Oklahoma City, aged 58, died January 12 of carcinoma of the hand.

Dr. John Hughes Scott, Shawnee, aged 68, died October 11.

Dr. Joe Brown Rolater, Oklahoma City, aged 71, died December 18.

Dr. Fenwick Rieff Deans, Miami, aged 67, died December 31.

SOUTH CAROLINA

The Tri-State Medical Association of the Carolinas and Virginia met at Greenville, South Carolina, February 13, 14 and 15, and elected the following officers for the coming year: Dr. Francis B. Johnson, Charleston, South Carolina, President; Dr. John W. Davis, Jr., Lynchburg, Virginia, Dr. Charles N. Wyatt, Greenville, South Carolina, Dr. Foy Roberson, Durham, North Carolina, Vice-Presidents; and Dr. J. M. Northington, Charlotte, North Carolina, reelected Secretary-Treasurer.

Deaths

Dr. Robert Ernest Sumner, Rock Hill, aged 48, died January 19 of pneumonia.

Dr. Freeman Valentine Walker, Bluffton, Captain, U. S. Army, retired, aged 72, died January 21 of angina pectoris.

TENNESSEE

The Southern Interurban Gynecological and Obstetrical Society held its third meeting in Memphis in February and elected the following officers for the coming year: Dr. W. T. Pride, Memphis, Tennessee, President; Dr. R. A. Johnston, Houston, Texas, Vice-President; and Dr. Percy H. Wood, Memphis, Tennessee, Secretary-Treasurer. Dr. John M. Maury, Sr., Memphis, was elected an Honorary Member of the Society. Among those on the program were: Dr. Henry Schmitz and Dr. Joseph L. Baer, Chicago, Illinois; Dr. Jennings Crawford Litzenberg, Minneapolis, Minnesota; Dr. R. A. Bartholomew, Atlanta, Georgia; Dr. J. A. McIntosh, Dr. George R. Livermore, and Dr. Phil C. Schreider, Memphis, Tennessee.

Dr. Tinsley Harrison, Vanderbilt University, Nashville, will lecture on cardiac dyspnea during the Stuart McGuire Lectureship series at the Medical College of Virginia, Richmond, in April.

Continued on page 32

A WATER OF CONSTANT COMPOSITION

In order to obtain uniform results from the use of an alkaline mineral water, it is important that the water be always of the same composition.

Kalak is a palatable carbonated water containing various alkaline mineral salts in constant proportions.

KALAK WATER CO. OF NEW YORK, INC.
6 Church Street, New York City

Kalak
TRADE MARK REG. U.S. PAT. OFF.

Rickets Can Be Averted

through

IRRADIATED DRYCO

EDITORIAL: IRRADIATED MILK

(Journal of the American Medical Association, Nov. 26, 1932)

"Enough evidence is available, from the clinical as well as the experimental field, to give assurance that rickets can be averted. Either this information has not yet been sufficiently impressed on the public or else the available means of prophylaxis are not being used adequately."

" . . . there are two reasons why an activated milk should be singled out for prophylactic use; first and mainly because it provides a therapeutic measure which is automatic, in that the specific agent is embodied in the food which is essential for the nutrition of the infant."

(Amer. Jour. Pub. Health, Dec. 1932).

Dryco is the Only Irradiated Dry Milk Product

The same Dryco which has been successfully prescribed over a period of 16 years *plus an increased vitamin D factor.*

PRESCRIBE

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DRYCO

Made from superior quality milk from which part of the butterfat has been removed, irradiated by the ultraviolet ray, under license by the Wisconsin Alumni Research Foundation (U. S. Patent No. 1,680,818), and then dried by the "Just" Roller Process.

THE DRY MILK CO., INC.
Dept. SM,
205 East 42nd Street, New York

All Dryco in the Hands of Druggists is Irradiated

COUPON

Dry Milk Company, Inc., Dept. SM,
205 East 42nd St., New York, N. Y.

Please send special literature: Dryco—The Irradiated Milk; Irradiated Milk in the Treatment of Rickets; Milk Irradiated by the Carbon Arc Lamp (Abs.); The Prevention and Cure of Rickets Through Irradiated Milk—A Public Health Measure.

Continued from page 30

Dr. Edwin W. Cocke, Bolivar, formerly Superintendent of the Western State Hospital at Bolivar, is the newly appointed Commissioner of Institutions.

Dr. Jack Witherington has moved from Munford to Covington, where he has opened an office in the Walker Building.

Dr. J. W. Raulston has completed an internship in Panama and returned to Tracy City to open an office.

Dr. E. L. Grubb and Dr. Glen Grubb, Knoxville, have opened an office in the Medical Arts Building.

Dr. William Prentice Knox, Decatur, and Miss Alma Dyche were married in December.

Dr. Lloyd S. Nease, Newport, and Miss Mary Will Ault were married recently.

The Blount County Medical Society has elected the following officers for 1933: Dr. J. M. Waters, Walland, President; Dr. E. W. Griffin, Townsend, Vice-President; and Dr. H. A. Calloway, Maryville, Secretary-Treasurer.

The Bradley County Medical Society has elected the following officers for 1933: Dr. E. R. Ferguson, President; Dr. Vance H. Bell, Vice-President; and Dr. D. N. Arnold, Secretary-Treasurer; all of Cleveland.

The Campbell County Medical Society has elected the following officers for 1933: Dr. A. D. Butterworth, Eagan, President; and Dr. F. A. McClintock, Newcomb, Secretary-Treasurer.

The Carroll County Medical Society has elected the following officers for 1933: Dr. H. T. Collier, McKenzie, President; Dr. H. D. McGill, Clarksburg, Vice-President; and Dr. H. L. Alexander, McKenzie, Secretary-Treasurer.

The Chester, Henderson and Decatur Counties Medical Society has elected the following officers for 1933: Dr. L. C. Smith, Henderson, President; and Dr. W. I. Howell, Lexington, Secretary-Treasurer.

The Fentress County Medical Society has elected the following officers for 1933: Dr. J. Peery Sloan, Jamestown, President; and Dr. A. H. Crouch, Forbus, Secretary-Treasurer.

The Gibson County Medical Society has elected the following officers for 1933: Dr. George E. Spangler, Humboldt, President; Dr. F. Douglass, Dyer, Vice-President; and Dr. F. L. Roberts, Trenton, Secretary-Treasurer.

The Greene County Medical Society has elected the following officers for 1933: Dr. C. P. Fox, Sr., Greeneville, President; Dr. L. E. Dyer, Greeneville, Vice-President; and Dr. M. A. Blanton, Mosheim, Secretary-Treasurer.

The Hamblen County Medical Society has elected the following officers for 1933: Dr. F. F. Painter, President; and Dr. P. L. Henderson, Secretary-Treasurer; both of Morristown.

The Haywood County Medical Society has elected the following officers for 1933: Dr. John C. Thornton, President; Dr. John Chambers, Vice-President; and Dr. T. C. Chapman, Secretary-Treasurer; all of Brownsville.

The Knox County Medical Society has elected the following officers for 1933: Dr. A. H. Lancaster, President; Dr. R. G. Waterhouse, Vice-President; and Dr. Jesse C. Hill, Secretary-Treasurer; all of Knoxville.

The Lincoln County Medical Society has elected the following officers for 1933: Dr. W. F. Cannon, President; and Dr. J. M. McWilliams, Secretary-Treasurer; both of Fayetteville.

The McNairy County Medical Society has elected the following officers for 1933: Dr. John R. Smith, President; and Dr. H. C. Sanders, Secretary-Treasurer; both of Selmer.

The Robertson County Medical Society has elected the following officers for 1933: Dr. W. F. Fyke, Springfield, President; and Dr. W. S. Rude, Ridgetop, Secretary-Treasurer.

The Sullivan and Johnson Counties Medical Society has elected the following officers for 1933: Dr. O. S. Hauk, Kingsport, President; Dr. W. W. Widener, Mountain City, Vice-President from Johnson County; Dr. M. B. St. John, Bristol, Vice-President from Sullivan County; and Dr. W. K. Vance, Jr., Bristol, Secretary-Treasurer.

The White, Putnam, Cumberland, Overton and Jackson Counties Medical Society has elected the following officers for 1933: Dr. C. E. Reeves, Gainesboro, President; Dr. W. M. Breeding, Livingston, Vice-President; and Dr. T. M. Crain, Monterey, Secretary-Treasurer.

Deaths

Dr. George Moore Wampler, Jasper, aged 39, died December 24 of pneumonia.

Dr. Edward M. Culp, Clifton, aged 46, died January 3 in a Nashville hospital of pneumonia.

Dr. John W. Motley, Bethel Springs, aged 77, died December 14 of carcinoma of the cervical glands.

Continued on page 34

THELESTRIN
OVARIAN FOLLICULAR HORMONE

A standardized preparation of the ovarian follicular hormone for intensive ovarian therapy by hypodermic injection.

Indicated in the treatment of scanty menstrual flow, amenorrhea and the vasomotor and nervous symptoms of the menopause.

Each ampoule contains 25 rat units standardized by the Allen-Doisy method.

Boxes of 6 1-cc. ampoules

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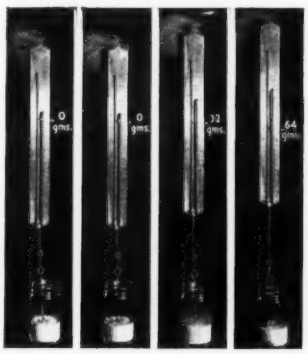
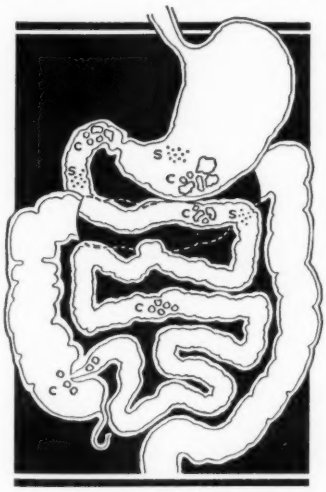
CURD TENSION
AND INFANT FEEDING —
ITS · EFFECT · UPON · THE · ASSIMILATION · OF
SALTS



BREAST MILK SIMILAC POWDERED MILK COW'S MILK



C—Cow's milk S—Similac
Schematic drawing of the relative size of the curds of cow's milk and Similac vomited by six weeks old puppies after one-half hour's ingestion.

"THE mineral salts play a very complicated part in digestion because they are not only absorbed by the intestines but also may be re-excreted into the digestive canal." [1]

"The mineral salts are of even greater importance in infancy than in later life because of the rapid growth of the bony structure . . . The salts are also necessary for cell growth and are important constituents of the blood and digestive juices, facilitating secretion, absorption and excretion." [2]

Some of the important mineral salts are encased within the large tough curds formed from cow's milk, and only those salts that are not encased in the curds are available for metabolism.

The curds formed from SIMILAC are small and flocculent, registering zero on the tensiometer, as shown in illustration, hence the mineral salts of SIMILAC are available for metabolism.

The salts of the cow's milk used in the preparation of SIMILAC are rearranged, particularly with reference to calcium, sodium, and potassium, as well as phosphorus and chlorine. SIMILAC has a salt balance that cannot be obtained in the ordinary milk dilutions or modifications as made in the home or laboratory.

The finer the curd the greater the surface area. The greater the surface area the more exposed are the fats, carbohydrates, proteins and salts to the digestive enzymes. Result . . . a more complete utilization of the food elements.

[1] Morse and Talbot: Diseases of Nutrition and Infant Feeding, pg. 59.
[2] Marriott: Infant Nutrition, pg. 43.

Samples and literature will be sent on receipt of your prescription blank.

SIMILAC—Made from fresh skim milk (casein modified); with added lactose, salts, milk fat and vegetable and cod liver oils.

M & R
DIETETIC LABORATORIES, INC.,
COLUMBUS, OHIO.

Continued from page 32

Dr. William Polk Moore, Jr., Portland, aged 75, died December 23 of chronic cystitis.

Dr. John D. Nuchols, Benton, aged 64, died December 31 of pneumonia and paralysis.

Dr. Charles W. McCollum, Bullsgap, aged 68, died December 7.

TEXAS

Dr. Abell D. Hardin, Dallas, has been elected President of the Baylor Hospital Staff; Dr. Joe C. Alexander was elected Vice-President; and Dr. Arthur C. Schooch was elected Secretary.

The Tri-State Medical Society held its annual meeting at Marshall in March.

Dr. Leslie E. Kelton, Jr., Corsicana, has succeeded the late Dr. T. P. McLendon as a member of the Board of Directors of the P. and S. Hospital of Corsicana.

Newly elected officers of the Staff of the Jefferson Davis Hospital, Houston, are as follows: Dr. Alvis E. Greer, President; Dr. Ray K. Daily, Vice-President; Dr. G. Allen Hyle, Chairman of the Surgical Division; Dr. F. Hartman Kilgore, Chairman of the Medical Division; and Dr. Harold Turner, Secretary.

Dr. G. H. Spurlock, Houston, is the newly elected President of the Staff of the Memorial Hospital; Dr. Herman Johnson is Vice-President; and Dr. Frank J. Iiams is Secretary.

Dr. Truman C. Terrell, Fort Worth, is the new Superintendent of the Methodist Hospital.

The "MESCO" Laboratories manufacture the largest line of Ointments in the world. Sixty different kinds. We are originators of the Professional Package. Specify "MESCO" when prescribing ointments. Send for lists.

Manhattan Eye Salve Co.

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Classified Advertisements

HOME FOR CONVALESCENTS—In Blue Grass section; guests received in well appointed home. Tired business executives, lonely shut-ins, slow convalescents and frail elderly persons receive personal care. Moderately priced. Endorsed by Franklin County Medical Association. Mrs. C. Montgomery, 507 West 2nd Street, Frankfort, Kentucky. Telephone 366.

ASSISTANCE OFFERED TO MEDICAL WRITERS. Research. Abstracts. Translations (all languages). Papers prepared from author's data. Ten years' experience with leading physicians and appointments on medical journals of highest standing. I employ no assistants; all my work is done personally and is reliable. Florence Annan Carpenter, 413 St. James Place, Chicago, Ill.

DRUG AND ALCOHOL PATIENTS are humanely and successfully treated in Glenwood Park Sanitarium, Greensboro, N. C.; reprints of articles mailed upon request. Address W. C. Ashworth, M.D., Owner, Greensboro, N. C.

FOR SALE—Complete x-ray and dark room equipment in good condition, 140 K. V. capacity. Owner leaving location for further study. Immediate sale necessary at reasonable buyer's price. For particulars address R. L., care JOURNAL.

The Angelina County Medical Society has elected the following officers for 1933: Dr. R. W. Taylor, President; Dr. J. W. Hawkins, Vice-President; and Dr. A. E. Sweatland, re-elected Secretary; all of Lufkin.

The Atascosa County Medical Society has elected the following officers for 1933: Dr. J. T. Guynes, Jourdanton, President; Dr. R. B. Touchstone, Lytle, Vice-President; and Dr. C. C. Shotts, Poteet, reelected Secretary-Treasurer.

The Bowie County Medical Society has elected the following officers for 1933: Dr. E. L. Beck, President; Dr. C. E. Kitchens, First Vice-President; Dr. W. A. Hutchinson, Second Vice-President; and Dr. L. P. Good, Secretary-Treasurer; all of Texarkana.

The Caldwell County Medical Society has elected the following officers for 1933: Dr. Abner A. Ross, Lockhart, President; Dr. M. W. Pitts, Luling, Vice-President; and Dr. Turner O'Banion, Lockhart, Secretary-Treasurer.

The Dallas County Medical Society has elected the following officers for 1933: Dr. Guy F. Witt, President; Dr. B. Rubenstein, Vice-President; and Dr. W. W. Fowler, Secretary-Treasurer; all of Dallas.

The Denton County Medical Society has elected the following officers for 1933: Dr. L. O. Hayes, Denton, President; Dr. Worth W. Harris, Pilot Point, Vice-President; and Dr. H. P. Thomas, Denton, Secretary-Treasurer.

The Eastland County Medical Society has elected the following officers for 1933: Dr. D. Ball, Cisco, President; Dr. F. C. Payne, Rising Star, Vice-President; and Dr. M. L. Stubblefield, Gorman, Secretary.

The Erath-Hood-Somervell Counties Medical Society has elected the following officers for 1933: Dr. J. J. Mulloy, Stephensonville, President; Dr. O. O. Gain, Dublin, Vice-President; and Dr. A. E. Lankford, Stephenville, Secretary.

The Gregg County Medical Society has elected the following officers for 1933: Dr. J. W. Fleming, Gladewater, President; Dr. J. D. Baucum, Longview, Vice-President; and Dr. E. O. Watkins, Longview, Secretary-Treasurer.

The Hardeman-Cottle-Foard-Motley Counties Medical Society has elected the following officers for 1933: Dr. J. F. Hughes, Roaring Springs, President; Dr. J. J. Hanna, Chillicothe, Vice-President; and Dr. Earl Vestal, Chillicothe, Secretary-Treasurer.

The Harris County Medical Society has elected the following officers for 1933: Dr. E. W. Bertner, President; Dr. William E. Ramsay, Vice-President; Dr. H. J. Ehlers, Secretary; and Dr. Carl W. Shirley, Treasurer; all of Houston.

The Hidalgo County Medical Society has elected the following officers for 1933: Dr. C. M. Williamson, Donna, President; Dr. L. J. Montague, Edinburg, Vice-President; and Dr. M. R. Lawler, Mercedes, Secretary-Treasurer.

The Johnson County Medical Society has elected the following officers for 1933: Dr. J. M. Stallcup, President; Dr. R. L. Harris, First Vice-President; Dr. J. W. Pickens, Second Vice-President; and Dr. C. C. Jowell, Secretary-Treasurer; all of Cleburne.

The Lamar County Medical Society has elected the following officers for 1933: Dr. H. H. White, Paris, President; Dr. Stephen H. Grant, Deport, Vice-President; and Dr. J. A. Stephens, Paris, Secretary-Treasurer.

The Mason-Menard-McCulloch Counties Medical Society has elected the following officers for 1933: Dr. S. B. Locker, Menard, President; Dr. J. S. Anderson, Brady, Vice-President; and Dr. G. G. McCollum, Mason, Secretary-Treasurer.

The Navarro County Medical Society has elected the following officers for 1933: Dr. William R. Sneed, President; Dr. R. C. Curtis, Vice-President; and Dr. L. E. Kelton, Jr., Secretary-Treasurer; all of Corsicana.

The Nueces County Medical Society has elected the following officers for 1933: Dr. O. H. Peterson, Corpus Christi, President; Dr. N. T. Gibson, Robstown, Vice-President; and Dr. Sterling B. Martin, Corpus Christi, Secretary-Treasurer.

The Parker County Medical Society has elected the following officers for 1933: Dr. Phil R. Simmons, President; Dr. P. L. Allen, Vice-President; and Dr. Alexander S. Garrett, Secretary-Treasurer; all of Weatherford.

The Smith County Medical Society has elected the following officers for 1933: Dr. C. C. McDonald, President; Dr. Howard Bryant, Vice-President; and Dr. L. B. Windham, Secretary; all of Tyler.

The Titus County Medical Society has elected the following officers for 1933: Dr. T. S. Grisson, President; Dr. T. R. Bassett, Vice-President; and Dr. John M. Ellis, Secretary-Treasurer; all of Mt. Pleasant.

The Wichita County Medical Society has elected the following officers for 1933: Dr. O. T. Kimbrough, President; Dr. H. D. Prichard, Vice-President; and Dr. Otto C. Egdorf, Secretary-Treasurer; all of Wichita Falls.

Continued on page 36

TWO PEAS IN A POD ARE *SELDOM* ALIKE

CONTRARY to the popular phrase, two peas in a pod are *never* alike—or almost never. But some things *are* alike. Two tins of Klim, for instance—any two. There is absolutely no variation. Klim, in fact, is the last word in uniformity when it comes to a milk supply.

The reason for this—the uniformity of Klim, the powdered whole milk—is to be found in the controlled sources of its supply. Some 15,000 healthy, selected cows furnish the pure whole milk from which Klim is made. From the selection of the tuberculin-tested herds, to and following the delivery of the milk to Klim plants—every step is scientifically guarded from the standpoint of hygiene and sanitation. Each tin of Klim *must* be like every other.

Another reason why the content of any one tin of Klim never varies in daily use is because of its keeping qualities. Klim is unaffected by climate or weather. No refrigeration is needed. This pure whole milk powder stays fresh and sweet indefinitely in the container, and for long periods of time even after the tin has been opened.

When, to uniformity, are added the factors of superior digestibility, high nutritive properties, convenience and, above all, safety, then Klim's record of 30 years' successful use by physicians in infant feeding can well be understood.

There is a place for Klim in your practise. You are urged to send for samples and convince yourself by a trial.

The Borden Company, Dept. KM 32 , 350 Madison Avenue, New York, N. Y.

KLIM

—*the* POWDERED WHOLE MILK

ACCEPTED AMERICAN MEDICAL ASSN.

Continued from page 34

The Southwest Texas District Society has elected the following officers for 1933: Dr. B. E. Pickett, Carrizo Springs, President; Dr. Joaquin Gonzalez, San Antonio, Vice-President; and Dr. T. E. Christian, San Antonio, reelected Secretary-Treasurer.

The Twelfth District Medical Society has elected the following officers for 1933: Dr. Marion M. Brown, Mexia, President; and Dr. Howard O. Smith, Marlin, reelected Secretary.

Deaths

Dr. John Howard Nesbitt, Dallas, aged 52, died in December of heart disease.

Dr. Julian Theodore Field, Fort Worth, aged 86, died December 25 of pneumonia.

Dr. Martin Gonzalez, Laredo, aged 82, died December 23 of influenza.

Dr. James Douglas Ward, San Antonio, aged 71, died January 13 of cerebral hemorrhage.

Dr. Frank Joseph Marecic, Flatonia, aged 42, died December 15 of a streptococcic infection.

Dr. Harry O. Sappington, Galveston, aged 72, died January 27 of cerebral hemorrhage.

Dr. James Le Roy Cooper, Fort Worth, aged 72, died January 13.

Dr. Green M. Coston, Ireland, aged 73, died in January.

Dr. Sam Houston Adams, Slaton, aged 58, died October 13.

Dr. Harry K. Read, Houston, aged 67, died December 8.

Dr. Charles L. Bellamy, Cranfills Gap, aged 58, died December 4.

VIRGINIA

The Medical College of Virginia announces the following participants in the Stuart McGuire Lectureship series at the Medical College, April 25-27: Dr. Ronald T. Grant, Department of Clinical Research, University College Hospital Medical School, London; Dr. Louis Hamman, Johns Hopkins University; Dr. Tinsley Harrison, Vanderbilt University; and Dr. Paul White, Harvard University.

Dr. Lawrence T. Royster, University, was a guest speaker at the Mid-South Postgraduate Medical Assembly in Memphis in February.

Dr. R. V. Funsten, University, Professor of Orthopedics in the Medical School, recently held a clinic at the Duke University Hospital, Durham, North Carolina.

Dr. Henry E. Davis, Williamsburg, has opened offices in the new Theater Building.

Dr. Stuart G. Aldhizer is the newly appointed Superintendent at Rockingham Memorial Hospital, Harrisonburg.

Dr. James Hunt Royster, Richmond, and Miss Louise Moss were married in February.

Dr. Manfred Call, III, and Miss Mary Poppenheim Miller, both of Richmond, were married in February.

The Albemarle County Medical Society has elected the following officers for 1933: Dr. Andrew D. Hart, President; Dr. W. E. Bray, Vice-President; and Dr. C. Bruce Morton, Secretary-Treasurer; all of University.

The Alexandria City Medical Society has elected the following officers for 1933: Dr. Henry A. Latane, President; and Dr. Walter E. Beattie, Secretary; both of Alexandria.

The Amelia County Medical Society has elected the following officers for 1933: Dr. George A. Arhart, Amelia, President; and Dr. James L. Hamner, Mannboro, Secretary.

The James City County Medical Society has elected the following officers for 1933: Dr. J. R. Parker, Providence Forge, President; and Dr. L. V. Henderson, Toano, Secretary.

The Louisa County Medical Society has elected the following officers for 1933: Dr. E. B. Pendleton, Cuckoo, President; and Dr. W. C. Mason, Gordonsville, Secretary.

The Medical Society of Northern Virginia has elected the following officers for 1933: Dr. E. C. Stuart, President; and Dr. J. E. Harris, Secretary; both of Winchester.

The Northampton County Medical Society has elected the following officers for 1933: Dr. Carey Henderson, President; and Dr. W. T. Green, Secretary; both of Nassawadox.

The Pittsylvania-Danville County Medical Society has elected the following officers for 1933: Dr. M. H. Watson, President; and Dr. P. W. Miles, Secretary; both of Danville.

The Rockbridge County Medical Society has elected the following officers for 1933: Dr. F. L. Thurman, Buena Vista, President; and Dr. E. P. Tompkins, Lexington, Secretary-Treasurer.

The Second District Medical Society has elected the following officers for 1933: Dr. J. A. Grizzard, Drewryville, President; and Dr. O. R. Yates, Suffolk, Secretary.

The Southampton County Medical Society has elected the following officers for 1933: Dr. John W. Smith, Branchville, President; and Dr. W. T. McLemore, Courtland, Secretary.

The Wise County Medical Society has elected the following officers for 1933: Dr. N. H. Short, Norton, President; Dr. S. H. Rivers, Calvin, Dr. C. H. Henderson, Norton, Dr. E. P. Cox, Norton, Vice-Presidents; and Dr. W. R. Culbertson, Norton, reelected Secretary-Treasurer.

Deaths

Dr. Daniel Webster Palmer, Cape Charles, aged 55, died November 10 of cerebral hemorrhage.

Dr. Charles Hyde Davidson, Lexington, aged 60, died January 23 of pneumonia.

Dr. Armistead Landon Wellford, Richmond, aged 75, died February 1.

Dr. Morris Winston Gibbs, Bellevue, aged 53, died January 30.

Dr. Hannes Inberg, Danville, aged 53, died January 27.

WEST VIRGINIA

Dr. Tyler Robert Boling, Beckley, and Miss Helen Ruth Connell were married in February.

Dr. Edwin O. Vaughan and Miss Louise Cunningham, both of St. Albans, were married in February.

The Marion County Medical Society has elected the following officers for 1933: Dr. Joe Yost, President; Dr. J. M. Trach, Vice-President; Dr. C. T. Francis, Secretary; and Dr. C. W. Waddell, Treasurer; all of Fairmont.

The McDowell County Medical Society has elected the following officers for 1933: Dr. G. L. Straub, Welch, President; Dr. C. F. Johnson, Welch, Vice-President; Dr. H. T. Schiefelbein, Welch, Secretary; and Dr. A. C. Van Reenen, Davy, Treasurer.

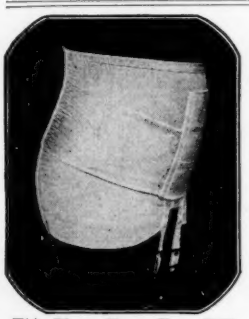
The Mercer County Medical Society has elected the following officers for 1933: Dr. C. J. Reynolds, Bluefield, President; Dr. W. M. Harloe, Matoaka, Vice-President; Dr. R. R. Stuart, Bluefield, reelected Secretary; and Dr. H. G. Steele, Bluefield, reelected Treasurer.

Deaths

Dr. Susan Dew Hoff, West Milford, aged 90, died January 2 of cerebral hemorrhage.

Trademark Registered **STORM** Trademark Registered

Binder and Abdominal Supporter



Gives perfect uplift and is worn with comfort. Made of Cotton, Linen or Silk, washable as underwear.

Three distinct types of Storm Supporters — many variations of each type.

This Photo Shows Type "N"

STORM supporters are made for all conditions needing abdominal uplift. Ptosis, Hernia, Pregnancy, Obesity, Relaxed Sacro-Iliac, Articulations, Kidney Conditions, Post-Operative Support, etc.

Each Belt Made to Order **Ask for Literature**

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From Hospital Nursery—Onward

UNDER THE DOCTOR'S SUPERVISION

The first months of the bottle-fed baby's life are a period of formula adjustment. In determining the formula and type of milk modifier best adapted to the individual infant, physicians have found that Mellin's Food aids in securing normal progress. Mellin's Food is a body building, easily digested preparation, derived chiefly from wheat and barley, and consisting of maltose and dextrins, together with proteins and salts of the grain. A small amount of potassium bicarbonate is added.

MELLIN'S FOOD COMPANY, *Boston, Mass.*

Why "Sweeten" the Baby's Bottle?

DEXTRI-MALTOSE IS A **CARBOHYDRATE** THAT DOESN'T CLOY THE BABY'S APPETITE

When the time comes to feed soups, vegetables and cereals to the infant whose formula has been modified with Dextri-Maltose **(not a sweetener)**—both the physician and the mother are gratified to notice the baby's eager appetite for solid foods, because

Dextri-Maltose Does Not Cloy

Viosterol

USE OF VIOSTEROL DURING PREGNANCY

To the Editor:—Please advise me whether administration of irradiated ergosterol to pregnant women could cause a premature calcification of the fetal head, resulting in dystocia, with possibly damage later to the child.

M.D., Waco, Texas.

J.A.M.A., *Dec. 19, 1931*, *p. 1914*

ANSWER.—There is no danger to mother or child from therapeutic doses of viosterol (irradiated ergosterol) given during pregnancy. In fact, such medication probably would be of advantage, owing to the excessive drain of calcium and phosphorus that takes place during this period. This medication is especially indicated in cases in which the intake of calcium compounds has been insufficient.

Safe in Pregnancy

Extra Calcium in the Diet

In palatable, readily assimilable form, Mead's Cereal supplies added food calcium (220 mgm. Ca per oz.) which is utilized by Mead's Viosterol.

MEAD'S VIOSTEROL IN OIL 250D, because of its well-known effect upon calcium absorption, is attracting increased interest among obstetricians for use during pregnancy. Aside from its mineral nutritional aspect, Mead's Viosterol in Oil 250D has a marked effect in lowering blood coagulation time. Samples and literature on request. Mead Johnson & Co., Evansville, Ind., U.S.A. Pioneers in Vitamin Research.

Please enclose professional card when requesting samples of Mead Johnson products to cooperate in preventing their reaching unauthorized persons.

There is Greater Margin of Safety in Mead's Dextri-Maltose

The Dextri-Maltose Group

Dextri-Maltose No. 1 (with 2% sodium chloride), for normal babies. Dextri-Maltose No. 2 (plain, salt free), for salt modifications by the physician. Dextri-Maltose No. 3 (with 3% potassium bicarbonate), for constipated babies. "Dextri-Maltose With Vitamin B" is now available for its appetite-and-growth-stimulating properties.

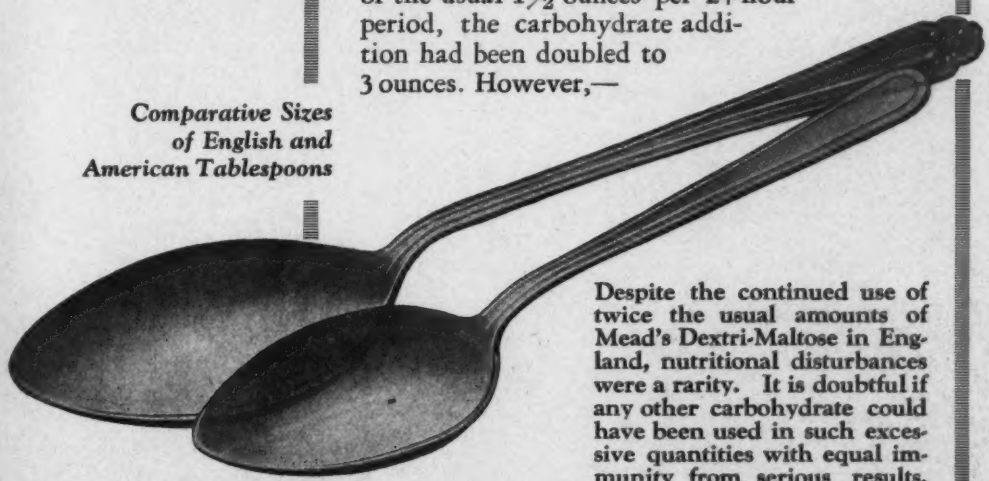
Samples on Request.

NOTHING tells more graphically the story of greater safety—the freedom from nutritional disturbances in infant feeding that goes with the use of Mead's Dextri-Maltose, than the circumstances surrounding its introduction in England.

In England, as in America, it had been prescribed—for modifying cow's milk—by the level tablespoonful.

It was not until Dextri-Maltose had been used in England for over three years, that a prominent English pediatrist pointed out that the British tablespoon is twice the size of the American. The English level tablespoon holds ½ ounce of Dextri-Maltose, the American, ¼ ounce. Where 6 American tablespoons had been prescribed in 24 hours, the infant was actually taking 12, or, in other words, instead of the usual 1½ ounces per 24-hour period, the carbohydrate addition had been doubled to 3 ounces. However,—

Comparative Sizes of English and American Tablespoons

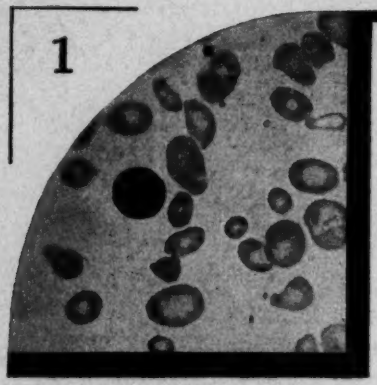


Despite the continued use of twice the usual amounts of Mead's Dextri-Maltose in England, nutritional disturbances were a rarity. It is doubtful if any other carbohydrate could have been used in such excessive quantities with equal immunity from serious results.

MEAD JOHNSON & COMPANY

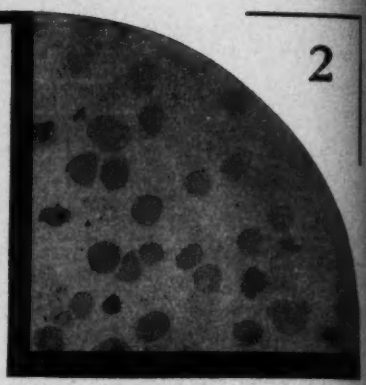
Evansville, Indiana

SPECIALISTS IN INFANT DIET MATERIALS



At left—Pernicious Anemia pretreatment level. R. B. C. 820,000 per cu. mm.; Hb. 17%. Started Ventriculin 40 Gm. daily.

At right—Fourth day of treatment. Reticulocytes 54%; R. B. C. 1,120,000 per cu. mm.; Hb. 24%.



BACK OF EVERY DOSE OF VENTRICULIN IS THE PRECISE HEMATOLOGIC RECORD OF ACTUAL CLINICAL TESTS MADE ON SUITABLE CASES OF PERNICIOUS ANEMIA

Each manufactured lot of Ventriculin (Desiccated Defatted Hog Stomach) is clinically tested and approved by the Thomas Henry Simpson Memorial Institute for Medical Research of the University of Michigan, Ann Arbor, Mich., before it is released for commercial distribution.

The required dosage is accurate and easily determined—10 grams daily for each million deficit in the erthyrocyte count. The average maintenance dose is 10 grams daily. Elderly patients and those with complications may require more.

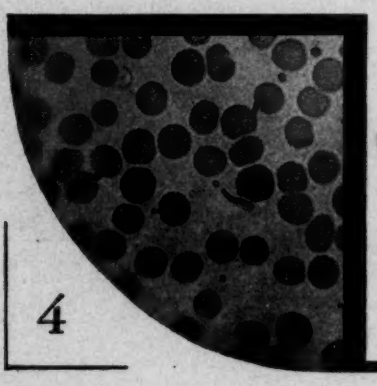
Ventriculin, P. D. & Co., is palatable, non-hygroscopic, and stable. It is suitable for prolonged treatment and does not induce nausea or aversion on continued administration. Accepted by the Council on Pharmacy and Chemistry of the American Medical Association.

PACKAGES

Supplied in packages of 12 and 25 vials, each vial containing 10 grams—also in an "Economy Package," a 100-gram bottle.

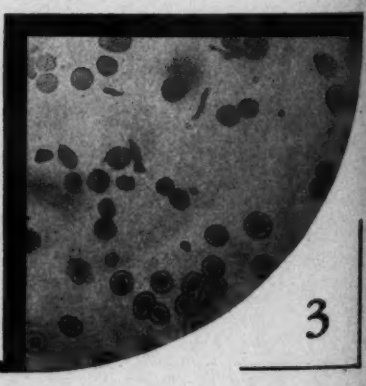
PARKE, DAVIS & COMPANY

The World's Largest Makers of Pharmaceutical and Biological Products



At right—Seventeenth day of treatment. R.B.C. 2,440,000 per cu. mm.; Hb. 56%.

At left—Sixty-sixth day of treatment. R.B.C. 4,610,000 per cu. mm.; Hb. 84%.



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